Cessna A-37

Airworthiness Certification

AIR-230 Airworthiness Branch
Federal Aviation Administration
Washington, D.C.
December 10, 2012

Front Cover Photographs: http://www.defenseimagery.mil.
Back Cover Photograph: http://www.dodmedia.osd.mil.

Introduction – A-37 Airworthiness Certification

This document provides information to assist in the airworthiness certification and safe civil operation of a Cessna A-37 airplane.

Attachment 1 provides a general overview of this document. Attachment 2 contains background information on the A-37 aircraft. Attachment 3 lists historic airworthiness issues with the A-37 for consideration in the certification, operation, and maintenance of these aircraft. The list is not exhaustive, but includes our current understanding of risks that should be assessed during in the certification, operation, and maintenance of these aircraft. Concerns regarding particular issues may be mitigated in various ways. Some may be mitigated via the aircraft maintenance manual(s) or the aircraft inspection program. Others may be mitigated via operating procedures i.e., SOPs) and limitations, aircraft flight manual changes, or logbook entries

Not all issues in attachment 3 may apply to a particular aircraft given variations in aircraft configuration, condition, operating environment, or other factors. Similarly, circumstances with an aircraft may raise other issues not addressed by attachment 2 that require mitigation. Attachment 4 includes additional resources and references. Attachment 5 provides some relevant A-37 accident and incident data.

Attachment 1 – Overview of this Document

Purpose

This document is to provide all those involved in the certification, operation, and maintenance of the A-37 aircraft with safety information and guidance to help assess and mitigate safety hazards for the aircraft. The existing certification procedures in FAA Order 8130.2, Airworthiness Certification of Aircraft and Related Products, do not account for many of the known safety concerns and risk factors associated with many high-performance former military aircraft. These safety concerns and risk factors associated with many high performance former military aircraft include—

- Lack of consideration of inherent and known design failures;
- Several single-point failures;
- Lack of consideration for operational experience, including accident data and trends;
- Operations outside the scope of the civil airworthiness certificate;
- Insufficient flight test requirements;
- Unsafe and untested modifications;
- Operations over populated areas (the safety of the non-participating public has not been properly addressed in many cases);
- Operations from unsuitable airports (i.e., short runways, Part 139 (commercial) airports);
- High-risk passenger carrying activities taking place;
- Ejection seat safety and operations not adequately addressed;
- Weak maintenance practices to address low reliability of aircraft systems and engines;
- Insufficient inspection schedules and procedures;
- Limited pilot qualifications, proficiency, and currency;
- Weapon-capable aircraft not being properly demilitarized, resulting in unsafe conditions;
- Accidents and serious incidents not being reported; and
- Inadequate accident investigation data.

Research of A-37 Safety Data

The aircraft, relevant processes, and safety data are thoroughly researched and assessed. This includes—

- Aviation Safety (AVS) Safety Management System (SMS) policy and guidance;
- Historical military accident/incident data and operational history;
- Civil accident data;
- Safety risk factors;
- Interested parties and stakeholders (participating public, non-participating public, associations, service providers, air show performers, flying museums, government service providers, airport owners and operators, many FAA lines of business, and other U.S. Government entities);
- Manufacturing and maintenance implications; and
- Design features of the aircraft.

This Document

The document is a compilation of known safety issues and risk factors identified from the above research that are relevant to civil operations. This document is organized into four major sections:

- General airworthiness issues (grey section),
- Maintenance (yellow section),
- Operations (green section), and
- Standard operating procedures and best practices (blue section).

This document also provides background information on the aircraft and an extensive listing of resources and references.

How to Use the Document

This document was originally drafted as job aids intended to assist FAA field office personnel and operators in the airworthiness certification of these aircraft. As such, some of the phrasing implies guidance to FAA certification personnel. The job aids were intended to be used during the airworthiness certification process to help identify any issues that may hinder the safe certification, maintenance, or operation of the aircraft. The person performing the certification and the applicant would to discuss the items in the job aid, inspect documents/records/aircraft, and mitigate any issues. This information would be used to draft appropriate operating limitations, update the aircraft inspection program, and assist in the formulation of adequate operating procedures. There are also references to requesting information from, or providing information to the person applying for an airworthiness certificate. We are releasing this document as drafted, with no further updates and revisions, for the sole purpose of communicating safety information to those involved in the certification, operation, and maintenance of these aircraft. The identified safety issues and recommended mitigation strategies are clear and can be considered as part of the certification, operation, and maintenance of the air aircraft.

Page Intentionally Left Blank

Attachment 2 - Background Information on the A-37 Aircraft

The A-37B, which were all newly built airframes, weighed almost twice as much as the T-37C. A remarkable fraction of the loaded weight, 5,880 lb, could be external stores. Modifications were made to control surfaces to improve handling.

To improve aircraft and crew survivability, the A-37B was fitted with redundant elevator control runs placed as far apart as possible. The ejection seats were armored, the cockpit was lined with nylon flak curtains, and foam-filled self-sealing fuel tanks were installed.

YAT-37D during 1964 tests at Edwards Air Force Base. Source: NARA.

The A-37B added a refueling probe to the nose, leading to pipes wrapped around the lower lip of the canopy, for probe-and-drogue aerial refueling. This was an unusual fit for USAF aircraft, which traditionally are configured for boom refueling. Other improvements included updated avionics, a redesigned instrument panel to make the aircraft easier to fly from either seat, an automatic engine inlet de-icing system, and revised landing gear. Like its predecessors, the A-37B was not pressurized.

A-37 during a close air support mission in Vietnam, 1967. Source. USAF.

In addition to 39 A-37As used for combat testing (most of which were later converted to the "B" standard), a total of 577 A-37Bs were delivered to USAF, 254 of which were delivered to the South Vietnamese Air Force.

In 1967, A-37As moved from England Air Force Base, Louisiana, to Bien Hoa, South Vietnam, and were tasked to test its A-37s in combat over 3 months. When the testing period drew to a close, the Dragonflies had logged more than 4,000 sorties without a single combat loss. The test proved to be a huge success. The USAF and Cessna improved the aircraft (A-37B). Thereafter, the 410th Combat Crew Training Wing began training the U.S. and Vietnamese Air Forces in the A-37B. The first A-37B arrived at Hurlburt Field in December 1969 for the 603rd Special

Operations Squadron. In July 1970, the 427th Special Operations Training Squadron assumed transition training in the A-37. Frontline service with the USAF and the South Vietnamese Air Force (VNAF) soon followed. A wartime total of over 160,000 sorties were flown. The USAF lost 22 A-37s in combat. The aircraft continued its combat operations with the VNAF, which had started A-37 operations in 1969. The A-37 was the most prevalent combat aircraft in the VNAF inventory.

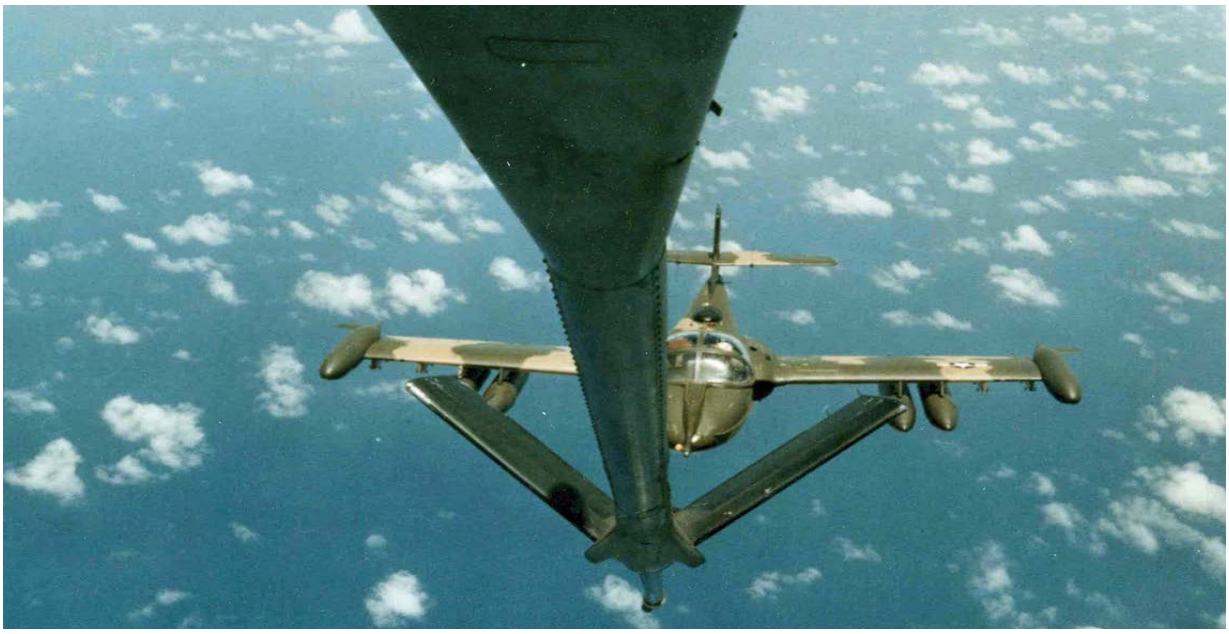
An USAF O/A-37 in the 1980s. Source: http://www.defenseimagery.mil.

Approximately 137 A-37s were in service with the VNAF when the country fell in 1975. North Vietnam's 937th Air Division was equipped with captured A-37Bs, and while stationed at Phan Rang AB, operated the aircraft well into 1979. The USAF recovered 92 aircraft. These aircraft were soon phased out of service probably due to lack of spares. After the war, the USAF passed their A-37Bs from the USAF Tactical Air Command (TAC) to TAC-gained units in the Air National Guard and Air Force Reserve.

In the early 1980s these aircraft were assigned to the Forward Air Control (FAC) role and given the designation OA-37B. The OA-37Bs were eventually phased out and replaced in the FAC mission by the much more formidable Fairchild Republic A-10 Thunderbolt II in regular Air Force, Air National Guard and Air Force Reserve service. OA-37s from the 24th Tactical Air Support Squadron also saw service during Operation Just Cause in 1989. The A-37 was retired from operational USAF use in 1992, although a few remained in service as test aircraft for a few more years.

A-37s remain in operation with Colombia, Ecuador, El Salvador, Guatemala, Honduras, Peru, and Uruguay. In several of these countries, the A-37B and the O/A-37B have been and continue to

be engaged in both combat and anti-narcotic operations. The aircraft have also been responsible for several shoot-downs involving civil aircraft during anti-narcotic operations in South and Central America.



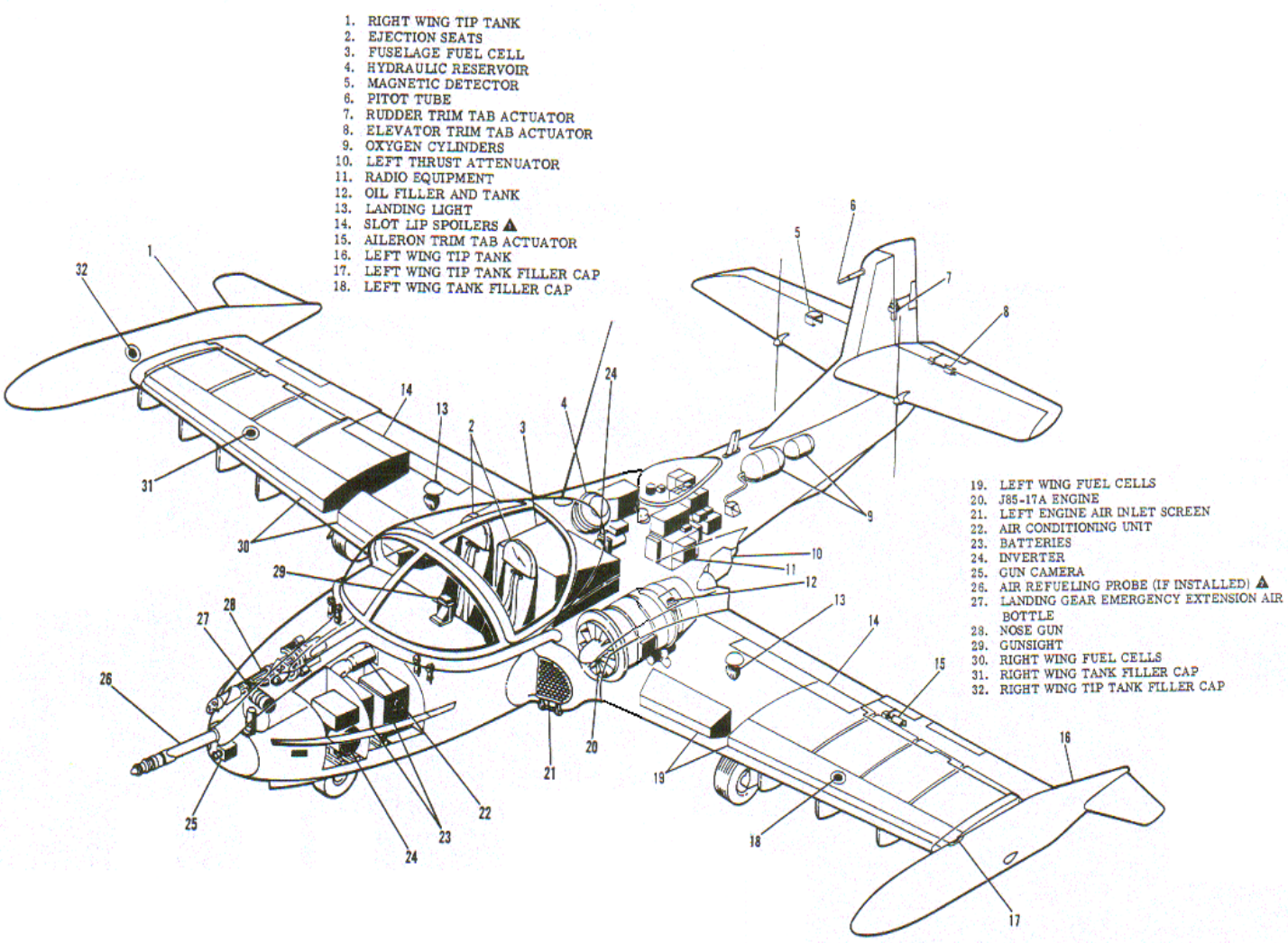
USAF A-37 during air refueling. Source: USAF.

Data indicates four A-37s are privately owned in Australia and New Zealand, and six are in the United States. It is believed the few A-37s that entered to civil registry in the 1980s and 1990s were aircraft that were "declared excess" by the Air Force in 1975. Since the 1980s, operations of A-37s in the United States have been few and far between, and those that are operating, are of foreign origin. In 1989, two A-37s were seized at the U. S.-Canadian border and were both relocated to static display in museums. One A-37 registered in the United States is N91RW, and it has been registered since 1993. In 1995, only one A-37 was operating in the United States. Other N-registered A-37 aircraft have included N128RA, N132RA, N3757U, and N3757Z.

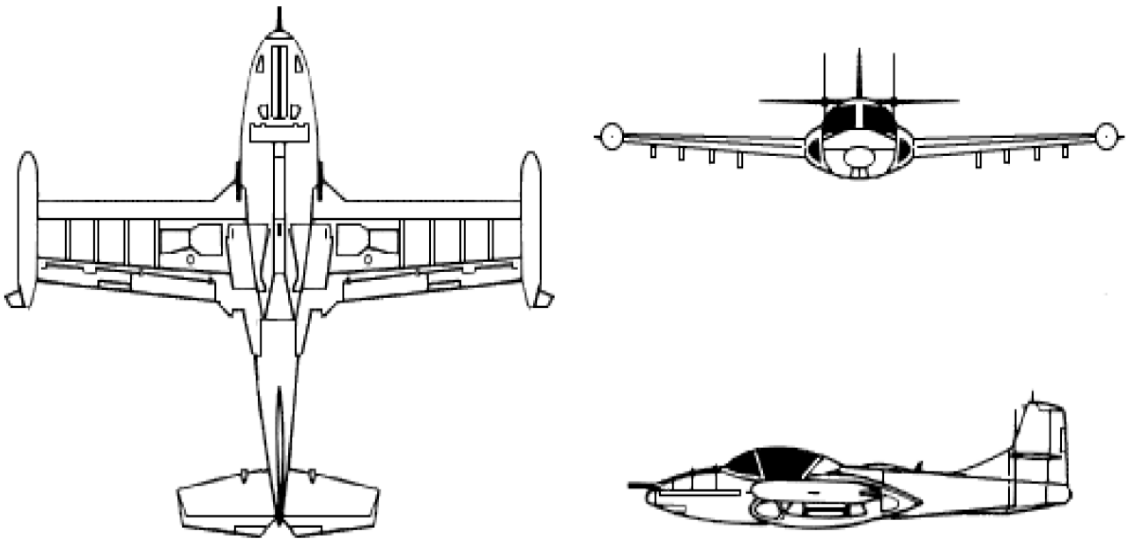
A USAF OA-37 aircraft during weapons testing in 1983. Source: http://www.dodmedia.osd.mil.

The majority of the A-37s in the FAA registry are of South Vietnamese origin. The USAF no longer surpluses combat aircraft. As a result, the potential for the A-37 population to grow in the United States is due to the number of imports from other countries, primarily from Australia and New Zealand (Ex-VNAF aircraft), or from some Central and South America countries, such as Chile, and Guatemala. Others may be imported from South Korea. Imports from those countries are difficult to determine because many of the aircraft were acquired by those countries under the Military Assistance Program (MAP), include U.S. funds, and there are requirements to return the aircraft to the USAF, most likely to storage or be parted for spare parts to support remaining operational aircraft.

In terms of safety data, the accident rate of the A-37 in USAF service was 5.06 accidents per 100,000 hours. For comparison purposes, the accident arte of the T-37 trainers was 1.02 accidents per 100,000 hours. Unfortunately, operational and accident data from the largest A-37 operators in central and South American is difficult to collect. However, from a fleet attrition rate standpoint, of the 577 A-37s produced, it is estimated that about 150 A-37s or 26 percent were lost in non-combat-related accidents.



Source: USAF TO-1A-37B-1.



Source: Above, U.S. Army, FM 44-80. Below: Close-up of an early A-37A, USAF Museum.

Specifications (A-37B)

General Characteristics

- Crew: 2
- Length: 28 ft 3.4 in; Wingspan: 35 ft 10.3 in
- Height: 8 ft 10.3 in; Wing area: 183.9 ft²
- Empty weight: 6,211 lb; Maximum takeoff weight: 14,000 lb
- Powerplant: 2 × General Electric J85-GE-17A turbojet, 2,850 lb each

Performance

- Maximum speed: 440 knots at 16,000 ft; Cruise speed: 425 knots at 25,000 ft
- Range: 800 nm; Combat radius: 400 nm with 4,100 lb load
- Service ceiling: 41,765 ft; Rate of climb: 6,990 ft/min

Armament

- Guns: 1× 0.308 in (7.62 mm) GAU-2B/A Minigun (mounted in nose)
- Hardpoints: 8 under-wing points
- Gun pods: SUU-11/A (1× 7.62 mm M134 Minigun), GPU-2/A cannon
- Rockets: four pods; Missiles: AIM-9 Sidewinder
- Bombs: 500 lb (241 kg) Mk.82 (×4 on multiple ejector racks), SUU-14 dispenser
- Other: Napalm tanks, SUU-25/A Flare Dispenser

Air National Guard OA-37s in the 1980s. Source: http://www.defenseimagery.mil.

A-37 Versions and Variants

- YAT-37D: Two former T-37C trainer prototypes converted for counter-insurgency operations with two J-85-GE engines and six under wing pylons as prototypes for the A-37 series, re-designated YA-37A.

- YA-37A: Two YAT-37D prototypes re-designated.
- A-37A: (Cessna Model 318D) T-37B rebuilt with two J-85-GE-5 engines, a 7.62 mm Minigun in nose and eight under wing stores pylons, 39 conversions.
- A-37B: (Cessna Model 318E) Production version with two J-85-GE-17A engines, provision for in-flight refueling, increased fuel capacity and strengthened airframe, 577 built.
- OA-37B: The OA-37B Dragonfly was an armed observation aircraft developed during the Vietnam War. The OA-37B Dragonfly replaced the aging O-2A Skymaster in the early 1980s. It continued operations with the USAF until at least 1991.

USAF A-37s in the 1970s. Source: http://www.defenseimagery.mil.

Foreign Operators

- Chile: Chilean Air Force received 44 aircraft - Retired by the end of 2009, the last two aircraft were flown to Santiago-El Bosque AFB for storage on May 27, 2010.
- Colombia: Colombian Air Force received 32 aircraft - 13 are currently in service.
- Dominican Republic: Dominican Air Force received 8 aircraft. Retired by March 2001.
- Ecuador: Ecuadorian Air Force received 28 aircraft - four are still operational.
- El Salvador: El Salvador Air Force received 15 aircraft - nine are currently in service.
- Guatemala: Guatemalan Air Force received 13 aircraft - two remain in service.
- Honduras: Honduran Air Force received 17 aircraft - 10 remain operational.
- Peru: Peruvian Air Force received 53 aircraft - only 10 remain operational. Peru has recently acquired 8 A-37Bs donated by South Korea.
- South Korea: South Korean Air Force introduced the A-37 in 1976. These aircraft were retired in 2007.
- South Vietnam: Vietnam Air Force received 254 aircraft.
- Thailand: Royal Thai Air Force received 20 aircraft. (All retired).
- Uruguay: Uruguayan Air Force received 14 aircraft - 10 currently in service.

- Vietnam: Vietnam People's Air Force captured 95 ex-South Vietnamese A-37B aircraft. Some sent to Soviet Union for testing.

A-37B Production

USAF Serial Numbers	Cessna Production Numbers
67-14776 / 67-14823	43001 / 43048
67-22483 / 67-22491	43049 / 43057
68-7911 / 68-7980	43058 / 43127
68-10777 / 68-10827	43128 / 43178
69-6334 / 69-6446	43179 / 43291
70-1277 / 70-1312	43292 / 43327
71-0790 / 71-0854	43328 / 43392
71-0858 / 71-0873	43393 / 43408
71-1409 / 71-1416	43409 / 43416
73-1056 / 73-1115	-
73-1654 / 73-1658	43417 *to* 43426
74-0998 / 74-1013 (*16 to Chile as J-600 / J-615)*	43447 *to* 43497
74-1694 / 74-1723 (*24 to Peru; 6 to Honduras)*	43449 *to* 43491
75-0374 / 75-0385	-
75-0410 / 75-0417 (*8 to Uruguay as 270 / 277).*	43540 / 43547
75-0424 / 75-0441 (*18 to Chile as J-616 / J-633).*	43548 / 43565
75-0669 / 75-0680 (*12 to Peru as FAP145 / FAP156)*	43566 / 43577
TOTAL: 577	**Source: http://www.uswarplanes.net**

USAF museum's A-37B. Source: USAF.

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
A-37 Preliminary and General Airworthiness Inspection Issues			
1.	Aircraft Familiarization	Become familiar with the aircraft before initiating the certification process. One of the first steps in any aircraft certification is to be familiar with the aircraft in question, in this case the A-37. Such knowledge, including technical details are essential in establishing a baseline as the certification process moves forward.	
2.	Aviation Safety (AVS) Safety Management System (SMS) Guidance	Use the AVS SMS guidance as part of the airworthiness certification process, as it supplements the existing Code of Federal Regulations. *FAA Order VS8000.367, May 14, 2008* and *FAA Order VS8000.369, September 30, 2008* are the basis for, but not limited to (1) identifying hazards and making or modifying safety risk controls, which are promulgated in the form of regulations, standards, orders, directives, and policies, and (2) issuing certificates. AVS SMS is used to assess, verify, and controls risks; and safety risk management is integrated into applicable processes. Appropriate risk controls or other risk management responses are developed and employed operationally. Safety risk management provides for initial and continuing identification of hazards and the analysis and assessment of risk. The FAA provides risk controls through activities such as the promulgation of regulations, standards, orders, directives, advisory circulars, and policies. Such as safety risk management process (1) describes the system of interest, (2) identifies the hazards, (3) analyzes the risk, (4) assesses the risk, and (5) controls the risk.	
3.	Preliminary Assessment	Conduct a preliminary assessment of the aircraft to determine condition and general airworthiness.	
4.	Condition for Safe Operation	This is an initial determination by an FAA inspector or authorized Representative of the Administrator that the overall condition of an aircraft is conducive to safe operations. This refers to the condition of the aircraft relative to wear and deterioration. The FAA inspector will make an initial determination as to the overall condition of the aircraft. The aircraft items evaluated depend on information such as aircraft make, model, age, type, completeness of maintenance records of the aircraft, and the overall condition of the aircraft.	
5.	Main Safety Issues	This document addresses the following general safety concerns regarding the A-37: • Lack of consideration of inherent and known design failures; • Lack of consideration for operational experience, including accident data and trends; • Operations outside of the scope of the airworthiness certificate being sought; • Insufficient flight test requirements; • Unsafe, and untested modifications; • Operations over populated areas (the safety of the non-participating public has not been properly addressed in many cases); • Operations from unsuitable airports; • High-risk passenger carrying activities taking place; • Ejection seat safety and operation not adequately addressed; • Weak maintenance practices to address low reliability of aircraft systems and engines; • Ignoring required inspections scheduled and procedures; • Limited pilot qualifications, proficiency, and currency ; • Weapon-capable aircraft have not been demilitarized, resulting in unsafe conditions; • Extensive brokering is taking place; • Accidents and serious incidents not being reported; • Inadequate accident investigation data.	
6.	Denial	The FAA will provide a letter to the applicant stating the reason(s) for denial and, if feasible, identify which steps may be accomplished to meet the certification requirements if the aircraft does not meet the certification requirements and the special airworthiness certificate is denied. Should this occur, a copy of the denial letter will be attached to FAA Form 8130-6 and forwarded to AFS-750, and made a part of the aircraft's record.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
7.	Potential Reversion Back to Phase I	Notify the applicant that certain modifications to the aircraft will invalidate Phase II. These include: (a) structural modifications, (b) aerodynamic modifications, including externally mounted equipment except as permitted in the limitations issued, and (c) change of engine make, model, or power rating (thrust or horse power). The owner/operator may return the aircraft to Phase I to flight test specific items as required. However, major modifications such as those listed above may require new operating limitations. Phase I may have to be expanded as well. In August 2012, the National Transportation Safety Board (NTSB) issued safety recommendations concerning a fatal accident of an experimental high-performance aircraft that had undergone extensive modifications. The NTSB noted "the accident airplane had undergone many structural and flight control modifications that were undocumented and for which no flight testing or analysis had been performed to assess their effects on the airplane's structural strength, performance, or flight characteristics. The investigation determined that some of these modifications had undesirable effects. For example, the use of a single, controllable elevator trim tab (installed on the left elevator) increased the aerodynamic load on the left trim tab (compared to a stock airplane, which has a controllable tab on each elevator). Also, filler material on the elevator trim tabs (both the controllable left tab and the fixed right tab) increased the potential for flutter because it increased the weight of the tabs and moved their center of gravity aft, and modifications to the elevator counterweights and inertia weight made the airplane more sensitive in pitch control. It is likely that, had engineering evaluations and diligent flight testing for the modifications been performed, many of the airplane's undesirable structural and control characteristics could have been identified and corrected." As part of the probable cause, the NTSB stated that added "contributing to the accident were the undocumented and untested major modifications to the airplane and the pilot's operation of the airplane in the unique air racing environment without adequate flight testing." As a result of this investigation, the NTSB issued safety recommendations including requiring "aircraft owners to provide an engineering evaluation that includes flight demonstrations and analysis within the anticipated flight envelope for aircraft with any major modification, such as to the structure or flight controls." Refer to Modifications and *Phase I Flight Test,* below.	
8.	Identify A-37 Version and Sub-Variants	Identify the specific A-37 version being certificated, such as A-37A, A-38B, and O/A-37B. There are major differences among A-37 aircraft, not just in terms of engines, but major systems and weapons capability. Note: The differences between the standard A-37 and an O/A-37 can be significant.	
9.	A-37A Model	Ask applicant for background information if the aircraft is an A-37A. This is necessary because technically, only 39 A-37As were built, and after combat testing in Vietnam, these aircraft were likely brought up to A-37B standard.	
10.	Major Structural Components	Ask the applicant to identify and document the origin, condition, and traceability of major structural components.	
11.	TO 00-5-1 AF Technical Order System	Become familiar with TO 00-5-1 AF Technical Order System, May 1, 2011. This document provides guidance in the USAF TO system, which guides much of the documentation associated with the A-37 aircraft.	
12.	Aircraft Records	Request and review the applicable military and civil aircraft records, including aircraft and engine logbooks.	
13.	Australian CAA and New Zealand Airworthiness and Registration Records	Ask the applicant to provide copies of the relevant airworthiness and registration files for the aircraft because some A-37s may come into the United States from Australia and/or New Zealand. Operating limitations are particularly important. Note: In Australia, since 1992, A-37s are certificated in the Limited category, similar to the experimental exhibition category in the U.S. Known Australian registration numbers include: VH-AZD, VH-CPD, VH-XVA, and VH-DLO. Refer to http://casa-query.funnelback.com/search/. One of the A-37s registered in New Zealand carried the registered ZK-J.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
14.	Airframe and Engine Data	Ask applicants to provide the following: Airframe: • Import country; • N-Number; • Manufacture year and serial number; and • Airframe time and airframe cycles. Engine: • Type and variant; • Manufacture date and serial number; and • Overhaul data, location, provider, and engine time and cycles. Properly identifying the relevant and basic characteristics of the airframe and the engine are necessary in addressing the safety issues with the aircraft. The following excerpt from a NTSB report on a former military jet accident illustrates the seriousness of adequate records: "On May 15, 2005, a British Aircraft Corporation 167 Strike Master MK 83, N399WH, registered to DTK Aviation, Inc., collided with a fence during an aborted takeoff from Boca Raton Airport, Boca Raton, Florida. The airplane was substantially damaged and the commercial-rated pilot and passenger sustained minor injuries. The pilot initially stated he performed a preflight inspection of the aircraft which included a flight control continuity check. He had the passenger disable the gust lock for the flight controls. He performed a flight control continuity check before taxiing onto the runway for takeoff; no discrepancies were reported. The takeoff roll commenced and at the calculated rotation speed (70 knots), he "...began to apply pressure to stick and noticed an unusual amount of load on the controls. I made a quick trim adjustment to ensure that the forces on the stick were not the results of aerodynamic loads. When the trim changes yielded no change, I initiated an abort (at approximately Vr at 80 knots) by retarding the throttle, extending the speed brakes, and applying the wheel brakes." He notified the tower of the situation, briefed the passenger, and raised the flaps. He also opened the canopy after realizing that he was unable to stop on the runway. The airplane traveled off the end of the runway, rolled through a fence and came to rest upright. The pilot also stated that the airplane is kept outside on the ramp at the Boca Raton Airport. Examination of the airplane by an FAA operations inspector before recovery revealed the control column would only move aft between 1/4 and 1/2 inch. No determination was made as to the position of the control lock in the cockpit. Examination of the airplane following recovery by an FAA airworthiness inspector revealed that the elevator was free to travel through the full range but was noted to be '...very stiff.' Additionally, the rudder was '...extremely hard to move in either direction." During movement of the elevator flight control surface, the rudder flight control surface was noted to move, and with movement of the rudder flight control surface, the elevator flight control surface was noted to move. A review of a United Kingdom Civil Aviation Authority (U.K. CAA) Mandatory Permit Directive (MPD) No. 2002-001 R1, issued on January 16, 2003, indicates'...partial binding or complete seizure of the elevator/rudder concentric torque tube bearings causing an interconnect between elevator and rudder control systems. This interconnection has resulted in un-commanded rudder movement with the application of elevator control inputs and vice versa. Investigation has determined that bearing seizure was due to inadequate lubrication and water ingress in the elevator torque tube bearings. Aircraft subject to external storage are particularly prone to this occurrence. A review of the airplane maintenance records revealed the airplane was last inspection on June 29, 2004, in accordance with, "...the scope and detail of the inspection program approved by the FSDO for BAC 167 Strikemaster dated June 29, 2001, and found it to be in safe operating condition at this time." The logbook entry does not indicate airplane total time; therefore, the time since the inspection was not determined. There was no record that U.K. CAA MPD No. 2002-001 R1 had been complied with."	
15.	Aircraft Ownership	Establish and understand the status of the ownership of the aircraft. It sets the stage for many of the responsibilities associated with operating the aircraft safely. There are many cases where former military aircraft are leased from other entities, and this can cloud the process. For example, if the aircraft is leased, the terms of the lease may be relevant as part of the certification because the lease terms may restrict what can be done to the aircraft and its operation for safety reasons.	
16.	FAA Records Review	Review the existing FAA airworthiness and registration files (EDRS) and search the Program Tracking and Reporting Subsystem (PTRS) for safety issue(s) and incidents.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
17.	FAA Form 8100-1	Use FAA Form 8100-1 to document the airworthiness inspection. Using this form facilitates the listing of relevant items to be considered, those items' nomenclature, any reference (that is, NATO manual; FAA Order 8130.2, Airworthiness Certification of Aircraft and Related Products; regulations) revision, satisfactory or unsatisfactory notes, and comments. Items to be listed include but are not limited to— 1. FAA Form 8130-6; 2. § 21.193 of Title 14 of the Code of Federal Regulations (14 CFR); 3. FAA Form 8050-1; 4. 14 CFR § 45.11(a); 5. FAA Order 8130.2, paragraphs 4002a(7) and (10), 4002b(5), 4002b(6), 4002b(8), 4111c, and 4112a(2); 6. 14 CFR § 91.205; 7. § 91.417(a)(2)(i), airframe records and total time, overhaul; and 8. § 91.411/91.413, altimeter, transponder, altitude reporting, static system test.	
18.	Functionality Check	Ask the applicant to prepare the aircraft for flight, including all preflight tasks, startup, run-up, and taxi.	
19.	Adequate A-37 Manuals and Related Documentation	Ensure the existence of a complete set of the applicable USAF manuals, such as flight manuals, inspections and maintenance manuals, and engine manuals. An operator also needs to have the applicable technical orders (TO) to address known issues related to airworthiness, maintenance, and servicing. Relevant A-37 manuals include - • *A-37 Aircraft Flight Manual, T. O. 1A-37B-1;* • *USAF T.O. 1A-37B-1-1 Performance Supplement;* • *General Airplane Organizational Maintenance Technical Manual T.O. 1A-37B-2;* • *Aircraft Structural Repair instructions Manual, T.O. 1A-37B-3;* • *Ground Handling, Servicing and Airframe Maintenance Technical Manual, T.O. 1A-37B-2-2;* • *Hydraulically Operated Systems and Utility Systems Technical, T.O. 1A-37B-2-3;* • *Flight Control Systems, T.O. 1A-37B-2-4;* • *Power Plant, T.O. 1A-37B-2-5;* • *Aircraft Illustrated Parts Breakdown Manual, T.O. 1A-37B-4;* • *Aircraft Organizational Maintenance Manual - Wiring Diagrams and Data, T.O. 1A-37B-2-8; and* • *Electrical l Systems, T.O. 1A-37B-2-7;* • *Specialized Storage and Maintenance Procedures – Rocket Catapult & Ballistic Catapult, T.O. 11P1-31-7;* • *Specialized Storage and Maintenance Procedures – Cartridge Actuated Thrusters, T.O. 11P6-1-7, and* • *Specialized Storage and Maintenance Procedures – Cartridges Actuated Initiators, T.O. 11P3-1-7.*	
20.	Operational Supplements (OS)	Ensure the owner/operator has a complete set of the applicable OSs issued by the USAF to safely operate an A-37.	
21.	Availability of Documents Listed in the Applicable Aircraft List of Applicable Publication Manual	Review the aircraft inspection program (AIP) to verify compliance with the applicable version of Cessna A-37 aircraft list of applicable publication manuals or equivalent document. This document should contain the complete listing of all applicable USAF A-37 TOs.	
22.	Applicant/Operator Capabilities	Review the applicant's/operator's capabilities, general condition of working/storage areas, availability of spare parts, and equipment.	
23.	Scope and Qualifications for Restoration, Repairs or Maintenance	Familiarize yourself with the scope of the restoration, repairs, and maintenance conducted by or for the applicant.	
24.	Limiting Duration of Certificate	Refer to § 21.181 and FAA Order 8130.2, regarding the duration of certificates, which may be limited. An example would be to permit operations for a period of time to allow the implementation of a corrective action or changes in limitations. In addition, an ASI may limit the duration if there is evidence additional operational requirements may be needed at a later date.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
25.	Compliance With § 91.319(a)(1)	Inform the operator of operations that the aircraft are limited under this regulation. The aircraft cannot be operated for any purpose other than the purpose for which the certificate was issued. For example, in the case of an experimental exhibition certificate, the certificate can be used for air show demonstrations, proficiency flights, and flights to and from locations where the maintenance can be performed. Such a certificate is NOT IN EFFECT for flights related to providing military services (that is, air-to-air gunnery, target towing, ECM simulation, cruise missile simulation, and air refueling). Also refer to *Military/Public Aircraft Operations* below.	
26.	Multiple Certificates	Ensure the applicant submits information describing how the aircraft configuration is changed from one to the other in those cases involving multiple airworthiness certificates. This is important because, for example, some research and development (R&D, refer to, below) activities may involve equipment that must be removed to revert back to the exhibition configuration. Moreover, the procedures should provide for any additional requirement(s), such as additional inspections, to address situations such as high-G maneuvering that could have an impact on the aircraft and/or its operating limitations. Similarly, it should address removing R&D equipment that could be considered part of a weapon system may be required (refer to *Demilitarization* below). All applications for an R&D certificate must adhere to FAA Order 8130.29, Issuance of a Special Airworthiness Certificate for Show Compliance and/or Research and Development Flight Testing.	
27.	Public Aircraft Operations, State Aircraft Operations, Military Support Missions, DOD contracts	The special airworthiness certificate and attached operating limitations for this aircraft are not in effect during public aircraft operations as defined by US Code reference, 49 U.S.C. Section 40102 and 40125. They are also not in effect during state aircraft operations (typically military support missions, military contracts), as defined by Article 3 of ICAO's Convention on International Civil Aviation. *Aircraft used in military services are deemed state aircraft.* Also, see Operations Overseas below.	
28.	Re-Conforming to Civil Certificate	Following a public, state, or military aircraft operation, ensure the aircraft is returned, via an approved method, to the condition and configuration at the time of airworthiness certification before operating under the special airworthiness certificate issued following a public, state, or military aircraft operation. This action must be documented in a log or daily flight sheet. Ensure the applicant submits information describing how the aircraft configuration is changed from public aircraft operations, state aircraft, or other non-civil classification or activity back to a civil certificate. This is important because, for example, some military support activities may involve equipment or maneuvers that must be removed or mitigated to revert back to original Exhibition or R&D configuration. Moreover, the procedures should provide for any additional requirement(s), such as additional inspections, to address situations such as high-G maneuvering and sustained Gs that could have an impact on the aircraft and/or its operating limitations. Similarly, it should address removing equipment that could be considered part of a weapon system may be required (refer to *Demilitarization* below).	
29.	R&D Airworthiness Certification	R&D certification requires a specific project. Ensure the applicant provides detailed information such as— • Description of each R&D project providing enough detail to demonstrate it meets the regulatory requirements of §21.191(a); • Length of each project; • Provide the intended aircraft utilization to include the number of flights and/or flight hours for each project; • Aircraft configuration; • Describe the area of operation for each project; • Coordination with foreign CAA, if applicable; and • Provide contact information for the person/customer we may contact to verify this activity. Note: All applications for an R&D certificate should include review of FAA Order 8130.29, Issuance of a Special Airworthiness Certificate for Show Compliance and/or Research and Development Flight Testing.	
30.	Temporary Extensions	This new certification process using an aircraft-specific job aid is being introduced as aircraft are being considered for certification. As a result, the process allows for the field offices to consider temporary extensions of existing airworthiness certificates, as appropriate. This will enable AIR-200 to complete drafting of the aircraft-specific job aid or allow the field inspector(s) and the applicant additional time to complete a full review with the Job Aid. Field inspectors are cautioned when issuing a temporary extension to ensure any safety issues he or she believes need to be addressed and corrected are mitigated as part of this process. FAA Headquarters (AIR-200, AFS-800, and AFS-300) will assist if you have any questions concerning any issue affecting the aircraft.	
31.	Demilitarization	Verify the aircraft has been adequately demilitarized. This aircraft must remain demilitarized for all operations. The A-37 has a secondary mission as light attack aircraft. As such, it would be equipped with weapon systems. Removal of the gun alone, for example, does not suffice. Wiring, switches, and other subsystems, including pylons, need to be disabled as well. Safety issues with these systems include inadvertent discharge of flares, toxic chaff, electrical overloads of the aircraft electric system, danger of inadvertent release, structural damage, complex flight limitations, and harmful emissions. TO 00-80G-1, Make Safe Procedures for Public Static Display, dated November 30, 2002, can be used as a reference as well. Weapon systems that could be installed or incorporated into the A-37 include: GAU-2B/A Minigun; Mk. 20 Mod 4 gun sight, CA-505 optical gun sight; MJU-3/B, ALA-17 flare system, SUU-25/A Flare Dispenser; ALE-20; and SUU-11/A, SUU-14 dispenser, and ALQ-123.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
32.	Safety Discretion	The field inspector may add any requirements necessary for safety. Under existing regulations and polices, FAA field inspectors have discretion to address any safety issue that may be encountered, whether or not it is included in the job aid. Of course, in all cases, there should be justification for adding requirements. In this respect, the job aid provides a certain level of standardization to achieve this, and in addition, AIR-200 is available to coordinate a review (with AFS-800 and AFS-300) any proposed limitations an inspector may consider adding or changing. 49 U.S.C. § 44704 states that before issuing an airworthiness certificate, the FAA will find that the aircraft is in condition for safe operation. In issuing the airworthiness certificate, the FAA may include terms required in the interest of safety. This is supported by case law. 14 CFR § 21.193 *Experimental Certificates: General* requires information from an applicant, including, "upon inspection of the aircraft, any pertinent information found necessary by the Administrator to safeguard the general public." 14 CFR § 91.319 *Aircraft Having Experimental Certificates: Operating* provides "the Administrator may prescribe additional limitations that the Administrator considers necessary, including limitations on the persons that may be carried in the aircraft." Finally, in FAA Order 8130.2 *Airworthiness Certification of Aircraft and Related Products*, Chapter 4 *Special Airworthiness Certification*, effective April 16, 2011, also states the FAA may impose any additional limitations deemed necessary in the interest of safety.	
33.	Ex-VNAF (South Vietnamese Air Force) A-37s	Ask whether the aircraft is an ex-Vietnamese Air Force A-37. This is relevant because when 10 A-37s were exported to Australia in 1989, they had spent many years in storage and their condition (and records) was questionable. Note: After the fall of South Vietnam in 1975, the North Vietnam captured 95 A-37s and spares, some of which were used until 1979-80. However, the A-37 in VNAF service was plagued by a chronic lack of spares support and this affected their airworthiness then and possibly now.	
34.	Ex-Guatemalan Air Force A-37s	Ask whether the aircraft is an ex-Guatemalan Air Force A-37s. This is relevant because many of Guatemala's A-37s were retired because of the lack of spares, expired airframes, and poor condition overall. Those retired have been stored outdoors, in many cases totally disassembled, in less than ideal conditions. Refer to *IAI Maintenance,* below.	
35.	Ex-ROKAF A-37s	Ask whether the aircraft is an ex- (Republic of Korea Air Force (ROKAF) A-37. This is relevant because ROKAF's aircraft may have expired airframes, and were disposed, in part because of a lack of maintenance support.	
36.	AIRINC Maintenance	Ask the applicant if the aircraft in question has been maintained by AIRINC or any if its sub-contractors. If that is the case, ask for relevant documentation. This is important because that company has provided A-37 maintenance and upgrade services to South American A-37 operators, notably the Peruvian Air Force.	
37.	2009 Crash of ZU-BEX	Recommend the accident report concerning the 2009 Lightning T5 ZU-BEX be reviewed in detail. This report, published by the South African CAA in August 2012, provides valuable insight into the consequences of operating complex and high-performance former military aircraft in an unsafe manner. The relevant issues identified in the report include (1) ignoring operational history and accident data, (2) inadequate maintenance practices, (3) granting extensions on inspections, (4) poor operational procedures, and (5) inadequate safety oversight. Many of the issues discussed and documented in the accident investigation report are directly relevant to safety topics discussed in this A-37 airworthiness review document. The South African CAA report can be found at http://www.caa.co.za/.	
38.	Importation	Review any related documents from U.S. Customs and Border Protection and the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) for the aircraft. If the aircraft was not imported as an aircraft, or if the aircraft configuration is not as stated in Form ATF-6, it may not be eligible for an airworthiness certificate. There are many cases in which Federal authorities have questioned the origin of former military aircraft and its installed weapon system. Some have been seized. For example, 2 A-37Bs were seized at the Canadian border by U.S. Customs officials in 1989. Refer to FEDERAL FIREARMS REGULATIONS REFERENCE GUIDE, ATF Publication 5300.4, Revised September 2005 for additional guidance.	
39.	Brokering	Verify the application for airworthiness does not constitute brokering. Section 21.191(d) was not intended to allow for the brokering or marketing of experimental aircraft. This includes individuals who manufacture, import, or assemble aircraft, and then apply for and receive experimental exhibition airworthiness certificates so they can sell the aircraft to buyers. Section 21.191(d) only provides for the exhibition of an aircraft's flight capabilities, performance, or unusual characteristics at air shows, and for motion picture, television, and similar productions. Certificating offices must verify all applications for exhibition airworthiness certificates are for the purposes specified under § 21.191(d) and are from the registered owners who will exhibit the aircraft for those purposes. Applicants must also provide the applicable information specified in § 21.193.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
40.	Restrictions on Operations Overseas	Inform the applicant/operator that A-37 operations may be restricted and permission must be granted by foreign Civil Aviation Authority (CAA). The applicable CAA may impose any additional limitations as it deems necessary, and may expand upon the restrictions imposed by the FAA on the aircraft. In line with existing protocols, the FAA will provide the foreign aviation authority with any information, including safety information, for consideration in evaluating whether to permit the operation of the aircraft in their country, and if so, under what conditions and/or restrictions. It is also noted any operator offering to use a U.S. civil aircraft with an experimental certificate to conduct operations such as air-to-air combat simulations, electronic counter measures, target towing for aerial gunnery, and/or dropping simulated ordinances pursuant to a contract or other agreement with a foreign government or other foreign entity would not be doing so in accordance with any authority granted by the FAA as the State of Registry or State of the Operator. On the issue of operations overseas, FAA Chief Counsel's office noted in November 2012 that: ➢ "Under international law, the aircraft will either be operated as a civil aircraft or a state aircraft. The aircraft cannot have a combined status. If the aircraft are to be operated with civil status, then they must have FAA-issued airworthiness certificates. If the applicant/operator is seeking experimental certificates for R&D or Exhibition purposes for the aircraft, and if the FAA issues (or renews) those certificates for the aircraft, then the only permissible operation of the aircraft as civil aircraft in a foreign country, is for an R&D or Exhibition purpose. The applicant/operator cannot be allowed to accomplish other purposes during the same operation, such as performing the contract for a foreign air force. This position is necessary to avoid telling an operator that any R&D or Exhibition activity could serve as a cover for a whole host of improper activities using an aircraft with an experimental certificate for R&D or Exhibition purposes, rendering the R&D or Exhibition limitation on the certificate meaningless. ➢ The R&D or Exhibition activity would be a pretext for the real purpose of the operation. Accordingly, in issuing experimental certificates for an R&D or Exhibition purpose, the FAA must make it clear that any other activities or purposes for the operation, are outside the scope of permitted operations under the certificate. The FAA must also make clear that the operation as a civil aircraft requires the permission of the foreign civil aviation authority (CAA). In requesting that permission, the applicant/operator should advise the foreign aviation authority that the operation will be for an R&D or Exhibition purpose only and for no other purpose, including performing a contract for any foreign military organization. ➢ The applicant/operator must understand that if the foreign CAA asks FAA about the operation, the FAA will state "that the only permissible purpose of the operation is R&D or Exhibition, and an operation for any other purpose, even when conducted in conjunction with an R&D or Exhibition purpose, is outside the scope of the operations allowed under the certificate. ➢ If the applicant/operator operates the aircraft as state aircraft, then the national government of some country will have designated the aircraft as its state aircraft, and the host country, will have given the aircraft permission to operate through the issuance of a diplomatic clearance. That diplomatic clearance should include whatever terms and conditions that CAA deems necessary or appropriate for the operation. ➢ The aircraft, when operated as state aircraft, does not need an FAA airworthiness certificate, and the pilots of those aircraft do not need to hold FAA-issued airman licenses. Safety oversight responsibility for aircraft designated as state aircraft rests with the country that made the state aircraft designation. If the host country issues a diplomatic clearance for the operation of the aircraft, the aircraft would be deemed to be the state aircraft of that country. As a result, the FAA would not have any safety oversight responsibilities for the aircraft. As noted above, these aircraft would not need FAA airworthiness certificates, and the pilots of those aircraft would do not need to hold FAA-issued airman licenses. Safety oversight would rest with that country. Whether the entity exercising that oversight is a foreign military or the CAA of that country, is of no concern to the FAA.	
41.	Federally Obligated Airport Access	Inform the operator A-37 operations may be restricted by airports because of safety considerations. As provided by Title 49 of the United States Code (U.S.C.) § 47107(a), a federally obligated airport may prohibit or limit any given type, kind, or class of aeronautical use of the airport if such action is necessary for the safe operation of the airport or necessary to serve the civil aviation needs of the public. Additionally, per FAA Order 5190.6, FAA Airport Compliance Manual, the airport should adopt and enforce adequate rules, regulations, or ordinances as necessary to ensure safety and efficiency of flight operations and to protect the public using the airport. In fact, the prime requirement for local regulations is to control the use of the airport in a manner that will eliminate hazards to aircraft and to people on the ground. In all cases concerning airport access or denial of access, and based on FAA Flight Standards Service safety determination, FAA Airports is the final arbiter regarding aviation safety and will make the determination (Director's Determination, Final Agency Decision) regarding the reasonableness of the actions that restrict, limit, or deny access to the airport (refer to FAA Docket 16-02/08, FAA v. City of Santa Monica, Final Agency Decision; FAA Order 2009-1, July 8, 2009; and FAA Docket 16-06-09, Platinum Aviation and Platinum Jet Center BMI v. Bloomington-Normal Airport Authority).	

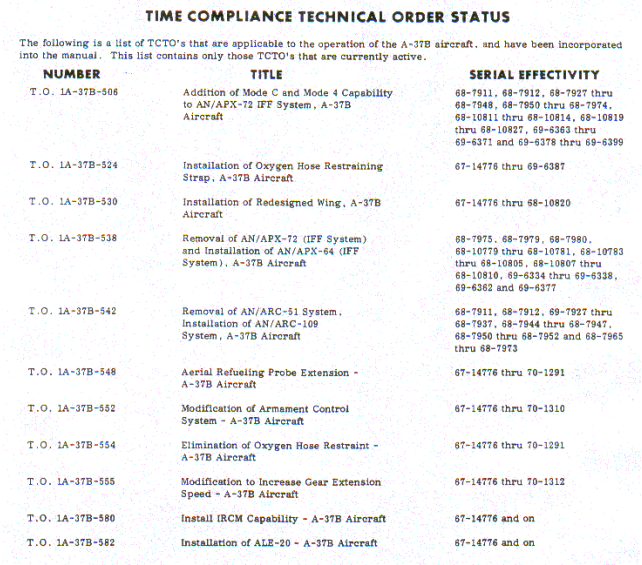
Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
42.	Environmental Impact (Noise)	Inform the operator that A-37 operations may be restricted by airport noise access restrictions and noise abatement procedures in accordance with 49 U.S.C. § 47107. As a reference, refer to FAA Order 5190.6. Note: The J85 engines are extremely noisy and this may have implications in terms of airport access and compliance with any FAA-approved noise levels restriction.	
43.	Initial Contact Checklist	The following is a sample of the contents of an initial contact by an FAA field office to an applicant concerning a proposed certification. It addresses many of the major safety and risk issues with the A-37 and will assist in (1) preparing an airworthiness applicant, (2) making corrections and updating any previous application, (3) document the level of airworthiness review. 1. Discuss item missing from the application a. Program letter setting the purpose for which the aircraft will be used i. Exhibition of aircraft flight capabilities, performance, unusual characteristics at air shows, motion picture, television and similar productions, and maintenance of exhibition flight proficiency, including flying to and from such air shows and productions. ii. Aircraft cannot be certified if the intention is to broker or sell the aircraft. iii. Aircraft photos 2. Prepare aircraft and documentation for FAA inspection a. Maintenance and modification records b. Aircraft history and logbooks (airframe, engine and components) c. Have the aircraft maintenance program ready for review and acceptance d. Have operations and maintenance and supplements e. Have crew qualifications ready for review (pilot, mechanics, A&P, IA) f. Be prepared to show spare parts records g. Be prepared to accomplish preflight, ground checks, run-up, and taxi checks h. Be prepared to demonstrate the aircraft has been demilitarized i. Have records on status of ejection seats j. Be prepared to discuss required ground support equipment and specialized tooling for maintenance k. Be prepared to discuss and document the airframe fatigue life program compliance l. Be prepared to discuss engine thrust measurement process m. Be prepared to demonstrate oxygen system checks n. If “G” suits are used be prepared to demonstrate serviceability o. Have records for any fabricated parts and engineering documentation if required p. Have records on flight control balancing q. Have weight and balance records r. Be prepared to discuss external stores s. Be prepared to discuss Phase I test flights (recommended 10 hours) t. Have record of installed avionics 3. Applicable regulations and Advisory Circulars a. §§21.93, 21.181, 21.193, 21.191(d), 23.1441, 43.3, 43.9, 45.11, 45.23(b), 45.25, 45.29, 91.205, 91.307, 91.319(a)(1), 91.407, 91.409(f)(4), 91.411, 91.413, 91.417, 91.1037, 91.1109, and AC 43-9, AC 91-79. 4. Items to discuss with applicant a. Recommendation of establishing a minimum equipment list b. Recommend establishing minimum pilot experience and proficiency, including (1) FAA PIC policy, USAF training, (2) 10 to 15 hours of dual time, and (3) 3 hours per month, and 5 takeoff and landings c. Recommend establishing minimum runways length criteria for T/O and Landing d. Discuss military use, that is, declaration of public use operations (PAO) and operating limitations	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
A-37 Maintenance Manual(s), Aircraft Inspection Program (AIP), and Servicing			
44.	Changes to Aircraft Inspection Program (AIP)	Consider whether the FAA-accepted AIP is subject to revisions to address safety concerns, alterations, or modifications to the aircraft. Section 91.415, Changes to Aircraft Inspection Programs, requires that "whenever the Administrator finds that revisions to an approved aircraft inspection program under § 91.409(f)(4) or § 91.1109 are necessary for the continued adequacy of the program, the owner or operator must, after notification by the Administrator, make any changes in the program found to be necessary by the Administrator." As provided by § 91.415, review the submitted maintenance manual(s) and AIP. Work with the applicant to revise the AIP as needed based on any concerns identified in attachment 2 to this document. For example, a A-37 AIP can be modified to address or verify— • Consistency with the applicable military TOs for airframe, powerplant, and systems to verify replacement/interval times are addressed. • All AIP section and subsections include the proper guidance/standards (that is, TOs or Engineering Orders) for all systems, groups, and tasks. • No "on condition" for items that have replacement times unless proper technical data to substantiate the change, that is, aileron boost and oxygen regulator. • Ejection seat system replacement times are adhered to. No "on condition" for rocket moors and propellants. Make the distinction between replacement times, that is, "shelf life" vs. "installed life limit." • Any deferred log is related to a listing of minimum equipment for flight. • Inclusion of document revision page(s).	
45.	AIP is Not a Checklist	Ensure the AIP stresses it is not a checklist. This is important in many cases because the actual aircraft inspection program is nothing else but a simple checklist and actual tasks/log book entries say little of what was actually accomplished and to what standard. This is one of the major issues with some FAA approved inspection programs. This stems from confusion with regards to the different nature of (1) aircraft maintenance manuals, (2) and aircraft inspection program, (3) an inspection checklist. In many cases, the actual aircraft inspection program is nothing else but a simple checklist. Unless a tasks or item points to Tech data (not just reference to a manual), it is simply a checklist, not a manual. Ensure that the inspection program directs the reader to other references such as Tech data, including references to sections and pages within a document (and revision level), that is, AC 43-13 p.318 or inspection card 26.2. Records must be presented to verify times on airframe and engines, inspections, overhauls, repairs and in particular, time in service, time remaining and shelf life on life limited parts. It is the owner's responsibility to ensure these records are accurate. Refer to *Classic Jet Aircraft Association* (C*JAA) Safety Operations Manual*, Rev. 6/30/08.	
46.	AIP Limitations	Refrain from assuming compliance with the applicable military standards, procedures, and inspections are sufficient to achieve an acceptable level of safety for civil operations, as part of the airworthiness certification and related review of the AIP. It might be true or it may not, depending on the situation and the aircraft. For example, an AIP based on 1978 USAF requirements for the A-37 is not necessarily going to address the additional concerns or issues 35 years later, such as aging, structural and materials deterioration, stress damage (operations past life-limits), extensive uncontrolled storage, new techniques, and industry standards.	
47.	AIP Revision Records	Ensure the applicant/operator retains a master of all revisions that can be reviewed in-accordance-with other dated material that may be require to be done under a given revision. The AIP should address revision history for manual updates and flight log history.	
48.	Maintenance Responsibilities	The AIP should address responsibilities and functions in a clear manner. The AIP should address the difference between the aircraft owner and operator. The AIP also needs to address any leasing arrangement where maintenance is spilt or otherwise outside of the control of the applicant, i.e., where maintenance is contracted to another party. The AIP should define the person responsible for maintenance. The AIP should address qualifications, and delegations of authority, that is, whether the person responsible for maintenance has inspection authority and airworthiness release authority, or authority to return for service. In terms of inspection control and implementation, the AIP should define whether it is a delegation of authority, and if so, what authority is being delegated by the owner and operator. This has been an issue with the NTSB and the CAB before it, since 1957.	
49.	Return to Service	Ensure the AIP clearly defines who can return the aircraft to service and provide the descriptions of minimum criteria for this authority. Follow the intent and scope of § 43.5 (Approval for return to service after maintenance, preventive maintenance, rebuilding, or alteration) and (§43.7 Persons authorized to approve aircraft, airframes, aircraft engines, propellers, appliances, or component parts for return to service after maintenance, preventive maintenance, rebuilding, or alteration).	
50.	Maintenance Practices	Consider Advisory Circular (AC) 43.13-2, Acceptable Methods, Techniques, and Practices-Aircraft Alterations, and AC 43.13-1, Acceptable Methods, Techniques, and Practices-Aircraft Inspection and Repair, in addition to any guidance provided by the manufacturer/military service(s), to verify safe maintenance practices.	
51.	Qualifications for Inspections	Ensure only FAA-certificated repair stations and FAA-certificated mechanics with appropriate ratings as authorized by § 43.3 to perform inspections on the A-37.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
52.	Modifications	Verify major changes do not create an unsafe condition and determine whether new operating limitations may be required within the scope and intent of § 21.93. In addition, the information contained in appendix A to part 43 can be used as an aid. Refer to *Potential Reversion Back to Phase I,* above. The following excerpt from a NTSB report illustrates the dangers of certain types of modifications and inadequate standards, technical guidance, and testing: "On June 18, 2011, about 1450 Pacific daylight time, an experimental Aero Vodochody L-29 Delfin, N37KF, experienced the partial failure of the primary airframe structure supporting the airplane's rudder while in the air race pattern at Reno-Stead Airport, Reno, Nevada. The commercial pilot, who was the sole occupant, was not injured, but the airplane, which was owned and operated by Raju Mann Ward, sustained substantial damage. The local 14 Code of Federal Regulations Part 91 air race qualification/training flight, which took off from the same airport about 20 minutes before the accident, was being operated in visual meteorological conditions. According to the Federal Aviation Administration (FAA) inspector who responded to the scene, while the airplane was in flight, part of the engine support structure that had been installed as part of a modification to install a higher thrust engine, had failed to hold the new engine in proper alignment. That failure allowed jet blast from the engine to be deflected onto a portion of the primary airframe structure. The melting of that structure affected the support and movement of the airplane's rudder. Although the failure occurred in flight, it was not detected until the pilot was operating the rudder pedals during the landing roll. Although the pilot was able to keep the airplane on the runway, she had to apply alternative/non-standard control inputs to do so. During the investigation it was determined that at least five other L-29 airplanes had the same type of mounts, which were all designed, welded/manufactured by the same entity. According to the FAA inspector who looked at these mounts, the welding was poor on some of them, and there was some degree of structural variation between a number of the mounts."	
53.	Adequate Maintenance Schedule and Program	Ensure the AIP follows USAF requirements, as appropriate, concerning inspections. Under USAF standards, the proper reference is the most current version of USAF TO 1A-37B-6-1. This is important when developing an inspection program under § 91.409. The inspection program must comply with both hourly and calendar inspection schedules. The only modifications to the military AIP should be related to the removal of military equipment and weapons. Deletions should be properly documented and justified. A 100-hour, 12-month inspection program under appendix D to part 43 may not be adequate for an aircraft like the A-37.	
54.	Airframe, Engine, and Component Replacement Intervals	Verify compliance with required replacement intervals as outlined in appropriate and most current USAF inspection guidance. If components are not replaced per the military guidance, ask for data to justify extensions. Applicants should establish and record time in service for all life-limited components and verify compliance with approved life limits. Set time limits for overrun of intervals and track cycles. Evaluate any overruns of inspection or maintenance intervals.	
55.	Missing Inspection Tasks	Verify the AIP follows USAF requirements in terms of inspection tasks. It is imperative that no inspection tasks required by the military standard are removed. If they are removed, there should be adequate justification, and it cannot be just related to cost. There are been several cases where an AIP does not conform to the applicable military standard and tasks are removed without adequate justification.	
56.	Appendix G to 14 CFR Part 23	Recommend that Appendix G to part 23 could be used as a tool (not a requirement) because it can assist in the review of the applicant's proposed AIP and associated procedures and sets a good baseline for any review. NAVAIR guidance should also contain instructions for the continued airworthiness of the A-37. Appendix G to part 23 covers discusses instructions for continued airworthiness.	
57.	Prioritize Maintenance Actions	Recommend the adoption of a risk management system that reprioritizes high-risk maintenance actions in terms of (a) immediate action, (b) urgent action, and (c) routine action. Also refer to *Recordkeeping, Tracking Discrepancies, and Corrective Action,* below.	
58.	Cannibalization	Cannibalization is a common practice for several former military aircraft operators and service providers. The extent to which it takes place is not necessarily an issue, but keeping adequate records of the transfers, uses and condition, is. In 2001, the GAO published its findings on cannibalization of aircraft by the DOD. It found cannibalizations have several adverse impacts. They increase maintenance costs by increasing workloads and create unnecessary mechanical problems for maintenance personnel. It also found that with the exception of the Navy, the services do not consistently track the specific reasons for cannibalizations. In addition, a Navy study found that cannibalizations are sometimes done because mechanics are not trained well enough to diagnose problems or because testing equipment is either not available or not working. Because some view cannibalization as a symptom of spare parts shortages, it is not closely analyzed in that other possible causes or concerted efforts to measure the full extent of the practice are not made.	
59.	Recordkeeping, Tracking Discrepancies, and Corrective Action	Check applicant recordkeeping. The scope and content of §§ 43.9, 43.11, and 91.417 are acceptable. Recommend the use the USAF form 781 process to help verify an acceptable level of continued operational safety (COS) for the aircraft. Three types of maintenance discrepancies can be found inside USAF Form 781: (1) an informational, that is, a general remark about a problem that does not require mitigation; (2) a red slash for a potentially serious problem; and (3) a red "X" highlighting a safety of flight issue that could result in an unsuccessful flight and/or loss of aircraft—no one should fly the aircraft until the issue is fixed. For more information on recordkeeping, refer to AC 43-9, Maintenance Records.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
60.	Qualifications of Maintenance Personnel	Check for appropriate qualifications, licensing, and type-specific training of personnel engaged in managing, supervising, and performing aircraft maintenance functions and tasks. The NTSB has found the use of non-certificated mechanics with this type of aircraft has been a contributing factor to accidents. Only FAA-certificated repair stations and FAA-certificated mechanics with appropriate ratings as authorized by § 43.3 perform maintenance on this aircraft.	
61.	Ground Support, Servicing, and Maintenance Personnel Recurrent Training	Recommend regular refresher training be provided to ground support, servicing, and maintenance personnel concerning the main safety issues surrounding servicing and flight line maintenance of the A-37. Such a process should include a recurrent and regular review of the warnings, cautions, and notes listed in TO 1A-37B-2-1, Technical Manual General Airplane. Note: Ejection seat safety is paramount.	
62.	USAF LEP (Life Extension Program)	Ask the applicant if the current USAF Life Extension Program (LEP), offered to many Latin American A-37 operators, has been incorporated into the aircraft. If not, it recommended that LEP data, namely any structural upgrades be considered.	
63.	Parts Storage and Management and Traceability	Recommend establishing a parts storage program that includes traceability of parts.	
64.	Maintenance Records and Use of Tech Data	Conduct a detailed inspection of maintenance records, as required by FAA Order 8130.2. Verify maintenance records reflect inspections, overhauls, repairs, time-in-service on articles, and engines. Ensure all records are current and appropriate technical data is referenced. This should not be a cursory review. Maintenance records are commonly inadequate or incomplete for imported aircraft. Refer to *Adequate A-37 Manuals and Related Documentation,* above.	
65.	J-85/CJ610 Airworthiness Directives	Recommend the applicable Airworthiness Directives involving certificated versions of the J85, the CJ610 engine, be considered as part of the AIP. These may include safety issues that may have to be addressed.	
66.	4,000-Hour Airframe Limitation	Verify whether the AIP addresses the A-37's 4,000-hour airframe limit and how total time is kept and the status of any extension. Verify the appropriate data is available to consider an extension to 7,000 hours between overhauls.	
67.	"On Condition" Inspections	Adhere to the military/manufacturer program and/or provide adequate data to justify that practice for the applicable part or component if "on condition" inspections are considered. "On condition" must reference an applicable standard (that is, inspect the fuel pump to an acceptable reference standard, not just "it has been working so far"). Each "on condition" inspection must state acceptable parameters. "On condition" inspections are not appropriate for all parts and components.	
68.	Aging	Verify that the AIP addresses the age of the aircraft. This means many, if not all of the age effects, have an impact on the aircraft, including: (1) dynamic component wear out, (2) structural degradation/corrosion, (3) propulsion system aging, (4) outdated electronics and (5) expired wiring.	
69.	Inspect and Repair as Necessary (IRAN)	Verify IRAN is detailed and uses adequate technical data (that is, include references to acceptable technical data) and adequate sequence for its completion if it is proposed (there was an A-37 IRAN program in the USAF). An IRAN must have a basis and acceptable standards. It is not analogous to an "on condition" inspection. It must have an established level of reliability and life extension. An IRAN is not a homemade inspection program.	
70.	IAI Maintenance	Ask the applicant whether the aircraft in question, especially if of Central and South American origin, was maintained by Israel Aircraft Industries (IAI). If so, ask for documentation and how it compares to USAF maintenance. Note; in the 1990s, IAI provided maintenance support to central American A-37 operators, notably the Guatemalan Air Force. In that instance, and upon inspection, several aircraft were found not be recoverable, and were used for spares.	
71.	Combining Inspection Intervals Into One	Set time limits for overrun (flex) of inspection intervals.	
72.	Aircraft Storage and Returning the Aircraft to Service After Inactivity	Verify the applicant has a program to address aircraft inactivity and specifies specific maintenance actions for return to service per the applicable USAF A-37 inspection schedule(s) (for example, after 31 days). The aircraft should be housed in a hangar during maintenance. When the aircraft is parked in the open, it must be protected from the elements, that is, full blanking kit and periodic anti-deterioration checks are to be carried out as weather dictates.	
73.	Specialized Tooling for A-37 Maintenance	Verify adequate tooling, jigs, and instrumentation are used for the required periodic inspections and maintenance per the A-37 maintenance manuals.	
74.	Technical Orders Issued While in Service	Verify the AIP references and addresses the applicable USAF T.O.s issued to the A-37 during military service to address airworthiness and safety issues, maintenance, modifications, updates to service instructions, and operations of the aircraft.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
75.	Use of Cycles (General)	Recommend the AIP provides for tracking cycle, such as airframe and engine cycles, in addition to time and in combination with inspections. This allows for the buildup of safety margins and reliability. In military jet aircraft like the A-37, there is a relationship between parts failures, especially as it relates to power plants, landing gears, and other systems, and for that reason it is very important to track airframe and engine cycles between failures and total cycles to enhance safety margins. Case in point, tracking all aircraft takeoffs for full-thrust and de-rated thrust takeoffs as part of the inspection and maintenance program would be a good practice and can assist in building up reliability data. The occurrence of failures can be readily reduced to meaningful statistics, and cycles can play an important role. When rates are used in the analysis, graphic charts (or equivalent displays) can show areas in need of corrective action. Conversely, statistical analysis of inspection findings or other abnormalities related to aircraft/engine check and inspection periods requires judgmental analysis. Therefore, programs encompassing aircraft/engine check or inspection intervals might consider numerical indicators, but sampling inspection and discrepancy analysis would be of more benefit. A data collection system should include a specific flow of information, identity of data sources, and procedures for transmission of data, including use of forms and computer runs. Responsibilities within the operator's organization should be established for each step of data development and processing. Typical sources of performance information are as follows, however, it is not implied that all of these sources need be included in the program nor does this listing prohibit the use of other sources of information: • Pilot reports, • In-flight engine performance data, • Mechanical interruptions/delays, • Engine shutdowns, • Unscheduled removals, • Confirmed failures, • Functional checks, • Bench checks, • Shop findings, • Sampling inspections, • Inspection discrepancies, and • Service difficulty reports.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
76.	Time Critical Technical Orders (TCTOs)	Verify the AIP specifically accounts for, addresses, and documents the applicable TCTOs issued to the A-37, while in service. Compliance with the TCTOs is essential for safe operations. If the AIP only makes reference to a few TCTOs issued in 1976, for example, it would not be adequate.  **TIME COMPLIANCE TECHNICAL ORDER STATUS** The following is a list of TCTO's that are applicable to the operation of the A-37B aircraft, and have been incorporated into the manual. This list contains only those TCTO's that are currently active. **NUMBER** / **TITLE** / **SERIAL EFFECTIVITY** T.O. 1A-37B-506 — Addition of Mode C and Mode 4 Capability to AN/APX-72 IFF System, A-37B Aircraft — 68-7911, 68-7912, 68-7927 thru 68-7948, 68-7950 thru 68-7974, 68-10811 thru 68-10814, 68-10819 thru 68-10827, 69-6363 thru 69-6371 and 69-6378 thru 69-6399 T.O. 1A-37B-524 — Installation of Oxygen Hose Restraining Strap, A-37B Aircraft — 67-14776 thru 69-6387 T.O. 1A-37B-530 — Installation of Redesigned Wing, A-37B Aircraft — 67-14776 thru 68-10820 T.O. 1A-37B-538 — Removal of AN/APX-72 (IFF System) and Installation of AN/APX-64 (IFF System), A-37B Aircraft — 68-7975, 68-7979, 68-7980, 68-10779 thru 68-10781, 68-10783 thru 68-10805, 68-10807 thru 68-10810, 69-6334 thru 69-6338, 69-6362 and 69-6377 T.O. 1A-37B-542 — Removal of AN/ARC-51 System, Installation of AN/ARC-109 System, A-37B Aircraft — 68-7911, 68-7912, 69-7927 thru 68-7937, 68-7944 thru 68-7947, 68-7950 thru 68-7952 and 68-7965 thru 68-7973 T.O. 1A-37B-548 — Aerial Refueling Probe Extension - A-37B Aircraft — 67-14776 thru 70-1291 T.O. 1A-37B-552 — Modification of Armament Control System - A-37B Aircraft — 67-14776 thru 70-1310 T.O. 1A-37B-554 — Elimination of Oxygen Hose Restraint - A-37B Aircraft — 67-14776 thru 70-1291 T.O. 1A-37B-555 — Modification to Increase Gear Extension Speed - A-37B Aircraft — 67-14776 thru 70-1312 T.O. 1A-37B-580 — Install IRCM Capability - A-37B Aircraft — 67-14776 and on T.O. 1A-37B-582 — Installation of ALE-20 - A-37B Aircraft — 67-14776 and on	
77.	USAF A-37 Safety Supplements	Verify the applicant/operator has copies of the applicable safety supplements for the A-37 and they are incorporated into the AIP or operational guidance as appropriate. The most current version of the Airplane Flight Manual (AFM) (or "-1", the TO number for AFM) usually provides a listing of affected safety supplements and this can be used as a reference.	
78.	Corrosion Due to Age and Inadequate Storage	Evaluate adequacy of corrosion control procedures. Age, condition, and types of materials used in the A-37 may require some form of corrosion inspection control. Ask whether a corrosion control program is in place. If not, ask for steps taken or how it is addressed in the AIP. Recommend the use of TO 1-1-691, Corrosion Prevention and Control Manual.	
79.	Pylons (Structural)	Verify the AIP addresses the inspection of the aircraft's pylons as per the applicable USAF guidance from a structural standpoint, including checking them for cracks. Note: In 1969, the aircraft were grounded and inspected for this reason.	
80.	Pylon Malfunctions	Verify the AIP addresses the inspection of the aircraft's pylons as per the applicable USAF guidance. This is applicable to the approved stations for external fuel tanks. This is important because the A-37 has a history of malfunctioning pylons and inadvertent in-flight separation of external stores. An investigation into several accident in-flight and inadvertent external stores separations with the Guatemalan Air Force indicates the pylon mounts and arming systems were faulty-could and did malfunction several times, including when taking-off.	
81.	J85-17A Engine Maintenance Procedures	Verify the AIP adheres to the USAF maintenance procedures requirements as per the applicable version of USAF TO 1A-37B-2-5 *Power Plant,* as the A-37 is equipped with the General Electric J85-GE-17A.	
82.	Manufacturer's and/or USAF Engine Modifications	Verify the AIP addresses the incorporation of the manufacturer and USAF modifications to the J85 engine installed. The NTSB and some foreign CAAs have determined a causal factor in some accidents is the failure of some civil operators of former military aircraft to incorporate the manufacturer's recommended modifications to prevent engine failures.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
83.	Cycles and Adjustment J85-17A Engine Replacement Intervals	Ask if both engine cycles and hours are tracked. If not, recommend it be done.	
84.	J-85-17A Engine Inspections and Time Between Overhaul (TBO)	Verify the applicant has established the proper inspection intervals and TBO/replacement interval for the specific engine type and adhere to those limitations and replacement intervals for related components. Justification and FAA concurrence is required for an inspection and TBO above those set in the appropriate A-37/engine inspection guidance. Clear data on TBO/time remaining on the engine at time of certification is critical as is documenting those throughout the aircraft life cycle.	
85.	Engine Check	Verify the AIP includes adequate procedures, including checks and sign-offs for returning an aircraft to airworthiness condition after any work on the engine. As an example, as part of its investigation of a fatal former military aircraft accident in 2004, the NTSB found after an engine swap-out the week before the fatal accident, the mechanics had warned the newly installed engine was not operating correctly. The record also shows the A&P mechanic who oversaw and supervised the engine change did not sign off any maintenance records to return the airplane to an airworthy status. Unfortunately, before the fatal flight, two engine acceleration tests failed and multiple aborted takeoffs in the days leading up to the fatal crash took place.	
86.	Engine Thrust	Verify the AIP includes measuring actual thrust of the engine and tracking engine operating temperatures.	
87.	Use of Different Fuels	Verify the AIP addresses how the use of different fuels may require changes or additions to the J85-17A engine inspection and maintenance programs.	
88.	Engine Ground Run	Verify the engine goes through a ground run and check for leaks after reassembly. Confirm it achieves the required revolutions per minute for a given exhaust gas temperature (EGT), outside air temperature, and field elevation.	
89.	Fire Detection System	Verify the serviceability of the fire detection system.	
90.	Servicing, Engine Fire Servicing Personnel Unfamiliar with the A-37 Create Hazardous Situations	Ensure the operator warns servicing personnel via training and markings of the fire hazard of overfilling oil, hydraulic, and fuel tanks. Lack of experience with A-37 servicing is a safety concern. Require supervision of servicing operations and fire safety procedures.	
91.	Fire Guard	Verify maintenance, servicing, preflight, and post-flight activities include fire guard precautions.	
92.	Engine Start	Verify the AIP includes procedures for documenting all unsuccessful starts.	
93.	Engine Storage	Review J85 engine storage methods and determine engine condition after storage. Evaluate calendar time since the last overhaul. For example, the use of an engine with 50 hours since a 1991 overhaul may not be adequate and a new overhaul may be required after a specified time in storage. Note: The FAA's position on experimental exhibition of former military aircraft is that engines that have exceeded storage life limits are susceptible to internal corrosion, deterioration of seals and coatings, and breakdown of engine preservation lubricants.	
94.	Engine Foreign Object Damage (FOD)	Verify adoption of an FOD prevention program (internal engine section, external, and air intake). Use and properly inspect the air intake screen (FOD guards) provided with the aircraft and designed for the A-37. In the A-37, the FOD guards or screens extend to protect the intakes when the aircraft is on the ground. They retract externally when in flight, and thus their condition (prevent in-flight separation) is important.	
95.	Engine Condition Monitoring (Oil Analysis)	As part of the engine maintenance schedule, recommend an engine Spectrographic Oil Analysis Program (SOAP) be implemented with intervals of less than 15 hours. If a baseline data exists, this can be very useful for failure prevention. If manufacturer baseline data does not exist, this may still warn of impending failure. For the latest guidance on SOAPs affecting the J85, refer to *Joint Oil Analysis Program Manual, Volume III: Laboratory Analytical Methodology and Equipment Criteria. (Aeronautical).* (Navy) NAVAIR 17-15-50.3, (Army) TM 38-301-3 (Air Force) TO 33-1-37-3, and (Coast Guard) CGTO 33-1-37-3. July 31, 2012. This document presents the methodology for evaluating spectrometric analyses of samples from aeronautical equipment. The methodology enables an evaluator to identify wear metals present in the sample and their probable sources, to judge equipment condition, and to make recommendations which influence maintenance and operational decisions. Following these recommendations can enhance safety and equipment reliability and contribute to more effective and economic maintenance practices.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
96.	Engine Bleed Air	Verify the AIP includes procedures for inspecting and ensuring the serviceability of the engine bleed air system.	
97.	Fuel Tanks Inspections and Related Structures	Verify the AIP includes procedures for inspecting the fuel tanks (and related structures). Deterioration of the fuselage bladder tank (aka 'Bag') and the sealant can pose a safety problem, especially because of the aircraft's age and storage, as well as the difficult inspection (access) itself. Bladder-type fuel tank safety is not necessarily ensured by only "on-condition" inspections and may require more extensive processes, including replacements. In any event, adequate data must be provided for any justification to inspect rather than replacing the fuel tanks at the end of their life limit.	
98.	Self-Sealing Foam	Another specific concern the AIP needs to address is the presence of any self-sealing foam, which was part of the fuel tank explosion protection system. Recommend it be removed. If not, its condition is a critical safety item. In the A-37, inside the fuel tanks, including the external fuel tanks, thermally articulated polyurethane foam was installed as a safety measure against anti-aircraft fire. Its civil use is questionable, especially in lieu of its dangers in terms of deterioration and potential for fuel system contamination.	
99.	Broken Systems (Fuel, Oil, and Hydraulic) Lines	Verify the AIP includes procedures for inspecting and replacing fuel, oil, and hydraulic lines according to the applicable USAF requirements; for example, MIL-DTL-8794 and MIL-DTL-8795 specifications.	
100.	Hydraulic Failures	Verify the AIP includes the comprehensive inspection and maintenance of the hydraulic system. In a 2009 A-37 incident in Australia, while at cruise, "the aircraft's hydraulic system failed and the crew used the emergency checklist. At destination, the landing gear was extended manually and a flapless landing was conducted." http://www.atsb.gov.au/media/673967/aws07aug09.pdf. In 2009, another Australian A-37 had a total hydraulic failure. http://www.atsb.gov.au/media/35940/aws150705.pdf.	
101.	Systems Functionality and Leak Checks	Verify procedures are in place to check all major A-37 systems in the aircraft for serviceability and functionality. Verify the leak checks of all systems are properly accounted for in the AIP per the USAF requirements.	
102.	Oil, Fuel, and Hydraulic Fluids	Verify procedures are in place to identify and use a list of equivalents of materials for replacing oil, fuel, and hydraulic fluids. A good practice by many operators is to include a cross-reference chart for NATO and U.S. lubricants as part of the AIP.	
103.	Electrical System and Batteries	Verify functionality of the generator and the compatibility of the aircraft's electrical system with any new battery installation or other system and component installation or modification. Avoiding overload conditions is essential because this is a known problem with the aircraft's electrical system.	
104.	Borescope Engine	Recommend the AIP incorporate borescope inspections of the engine at 50 hours per the applicable inspection procedures. AC 43.13-1 can be used as a reference.	
105.	Pitot/Static, Lighting, and Avionics and Instruments	Verify compliance with all applicable 14 CFR requirements (that is, § 91.411) concerning the pitot/static system, exterior lighting (that is, adequate position and anti-collision lighting), transponder, avionics, and related instruments.	
106.	Oxygen System	Emphasize inspection of the oxygen system and any modifications. Compliance with § 91.211, Supplemental Oxygen, is required. Recommend adherence to § 23.1441, Oxygen Equipment and Supply. Moreover, per FAA Order 8900.1, change 124, chapter 57, Maintenance Requirements for High-Pressure Cylinders Installed in U.S. Registered Aircraft Certificated in Any Category, each high-pressure cylinder installed in a U.S.-registered aircraft must be a cylinder manufactured and approved under the requirements of 49 CFR, or under a special permit issued by the Pipeline and Hazardous Materials Safety Administration (PHMSA) under 49 CFR part 107. There is no provision for the FAA to authorize "on condition" for testing, maintenance, or inspection of high-pressure cylinders under 49 CFR (PHMSA).	
107.	Air Bottle	Emphasize the proper inspection of the cylinders. As per FAA Order 8900.1 change 124, chapter 57 *Maintenance Requirements for High-Pressure Cylinders Installed in U.S. Registered Aircraft Certificated in Any Category*, each high-pressure cylinder installed in a U.S. registered aircraft must be a cylinder that is manufactured and approved under the requirements of 49 CFR, or under a special permit issued by PHMSA under 49 CFR part 107. There is no provision for the FAA to authorize "on condition" for testing, maintenance or inspection of high-pressure cylinders under 49 CFR. For example, the fire bottles are time sensitive items, and may have a limit of 5 years for hydrostatic testing. The issue is when the bottles are removed from the aircraft. It is industry knowledge that non-U.S. bottles may be installed as long as they are within their hydrostatic test dates. A problem arises when removing the bottles for hydrostatic testing. Maintenance programs require these bottles to be hydrostatic tested. Once the non-U.S. bottles are removed from the aircraft, they are not supposed to be hydrostatic tested, recharged, or reinstalled in any aircraft. Moreover, those bottles cannot be serviced (on board) after the testing date has expired.	
108.	Anti-G Suit System	If installed, verify its serviceability.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
109.	Cockpit Instrumentation Markings	Verify all cockpit markings are legible and use proper English terminology and in units acceptable to the FAA.	
110.	A-37 Safety Markings and Stenciling	Verify appropriate safety markings required by A-37 technical manuals (that is, stenciling and "Remove Before Flight" banners) have been applied and are in English. These markings provide appropriate warnings/instruction regarding areas of the aircraft that could be dangerous. These areas include intakes, exhaust, air brakes, and ejection seats. In the case of ejections seat systems, and as noted in FAA Order 8130.2, paragraph 4074(e), "a special airworthiness certificate will not be issued before meeting this requirement."	
111.	Incorrect Hardware	Verify the AIP incorporates the use of the correct hardware, for example, bolts. This must be emphasized in all civil operations because (1) original hardware may be difficult to acquire and (2) some aircraft may incorporate the non-approved items today.	
112.	Cockpit FOD	Verify the AIP addresses thorough inspection and cleaning of the cockpit area to preclude inadvertent ejection, flight control interference, pressurization valves clogging, and other problems. This is a standard USAF and U.S. Navy practice.	
113.	Tires and Wheels	Verify use of proper tires and/or equivalent substitutes (including inner tubes) and adherence to any tire limitation, such as allowed number of landings, inflation requirements, and the use of retreaded tires. The type of tire may dictate the number of landings. Wheels must be properly and regularly inspected and balanced.	
114.	Explosives and Propellants	Check compliance with applicable Federal, State, and local requirements for all explosives and propellants in terms of use, storage, and disposal in addition to verifying service (USAF) requirements are followed.	
115.	A-37 In-Flight Canopy Separation	Ensure the AIP addresses the proper maintenance and operating condition of all canopy locks.	
116.	Canopy Seals	Test canopy seals for leaks (that is, use ground test connection).	
117.	Emergency Canopy Jettison Mechanism	Verify the AIP includes testing the A-37 emergency canopy jettison mechanism. It must be functional and properly inspected per the applicable technical guidance. Note: The original canopy actuators were a major problem, and it was found that pilots could neither release nor jettison the canopy in an emergency situation.	
118.	Brake System	Emphasize a detailed inspection of the brake assemblies, adhere to manufacturer's inspection guidelines and replacement times, and consider more conservative inspections. Recommend brake inspection at 20 to 30 landings.	
119.	External Fuel Tanks	Verify the type, condition, installation, and removal of drop tanks meet requirements of the manufacturer or military operator. Only external tanks cleared for use by the aircraft manufacturer, USAF may be used on the aircraft. Other fuel tanks, such as the 375-litter tanks installed in Uruguayan A-37s should not be used. The only modification allowed to the external tanks is to prevent jettisoning. Accidental jettisoning of the tanks is a safety hazard. Any means of releasing the tanks during aircraft operation must be disabled.	
120.	Hoses and Cables	Inspect and replace hoses and cables appropriately. Due to the age of all A-37 aircraft, and in many cases, poor storage history, it is essential to ensure thorough inspections of all hoses and cables (multiple systems) and replace them in accordance with USAF guidance and requirements.	
121.	Grounding	Verify adequate procedures are in place for grounding the aircraft. Static electricity could cause a fire or explosion, set off pyrotechnic cartridges, or result in any combination of the above. In grounding the aircraft, it is essential that all electrical tools are grounded, and industry-approved explosion-proof flashlights or other lighting sources be used.	
122.	TO 00-25-172	Use TO 00-25-172 Ground Servicing of Aircraft and Static Grounding/Bonding, August 2012 as the baseline for all servicing functions. This manual describes physical and/or chemical processes which may cause injury or death to personnel, or damage to equipment, if not properly followed. This safety summary includes general safety precautions and instructions that must be understood and applied during operation and maintenance to ensure personnel safety and protection of equipment.	
123.	Antennae	Verify any original antennas are compatible with all installed electronics. In addition, verify the AIP includes the appropriate inspections of the antennae. Some new avionics may impose airspeed limitations. Over the years, many different antennae were installed in the A-37. For the basics on this issue, refer to Higdon, David. Aircraft as Antenna Farm. *Avionics,* Vol. 49, No. 9 (September 2012).	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
124.	Transparencies Problems	Ensure proper transparencies maintenance for safe operations. Monitor/inspect canopy for crazing every 10 hours of flight.	
125.	Hard Landings and Over G Situations	Verify hard landing and over-G inspection programs are adopted. This is especially important when acrobatics are performed or when the aircraft is involved in military support missions outside the scope of its experimental certificate (that is, public aircraft operations).	
126.	Parts Fabrication	Verify engineering (that is, Designated Engineering Representative (DER)) data supports any part fabrication by maintenance personnel. Unfortunately, many modifications are made without adequate technical and validation data. AC 43.18, Fabrication of Aircraft Parts by Maintenance Personnel, may be used for guidance.	
127.	Wing and Tail Bolts and Bushings	Ask about inspections and magnafluxing of wings, and tail bolts and bushings. Recommend the AIP incorporate other commonly used and industry-accepted practices involving non-destructive inspection (NDI) if not addressed in the manufacturer's maintenance and inspection procedures. Note: The A-37 operational history of close air support, low altitude flying with heavy loads, and the typical profiles the aircraft operated require detailed inspections of the wing attachment areas. Although the A-37 has a strengthened wing compared to the T-37, wing failures and structural problems have been a limiting factor in the T-37 aircraft's basic design.	
128.	Wing Carry-Thru Structure	Ensure the AIP specifically covers the inspection of the one piece ALCOA forging wing carry-thru structure. This structure could be prone to fatigue cracking due to the aircraft's high wing loading. The potential for this failure is what caused the manufacturer/USAF to re-enforce this area.	
129.	Spar Caps	Ensure the AIP specifically covers the inspection of the spar caps. These structures are essential to allow the carrying of external stores. The potential for failure in this area is what caused the manufacturer/USAF to add them.	
130.	Landing Gear Mounts	Verify the AIP includes the inspection of the wing/landing gear mounts areas as per the applicable USAF technical directives. In 1969, structural damage in those areas following a grounding order by the USAF. Note: The A-37 has a history of nose-gear failures.	
131.	Landing Gear Retraction Test	Verify the AIP provides for the regular landing gear retraction test as per USAF procedures and required equipment.	
132.	Landing Gear Doors	Verify the AIP incorporates adequate inspection procedures for the landing gear doors, actuators, and sequencers. In the A-37, the re-sequencing of the inboard doors was necessary to prevent them from being dragged on the ground when the gear is extended.	
133.	Landing Gear Post 71 Series Aircraft	Ask whether the aircraft is a pre-71 Series aircraft and whether the landing gear modifications are incorporated into the aircraft. These modifications include a sturdier structure, re-stressed and upgraded axles and legs, high flotation tires (not the original thin ones), modified 'D" doors, and better retraction time. If these changes are incorporated into the aircraft, ensure the AIP addresses them.	`
134.	Windscreen	Ask whether the aircraft has been equipped with the new windscreen. If not, the change is recommended. Not only was the original windscreen very vulnerable to bird strikes, it also created visual distortions and a tendency to fog over in light rain. Note: Due to a series of accidents caused by bird strikes between 1965 and 1970, all T-37s were later retrofitted with a new windscreen made of Lexan polycarbonate plastic ½ in thick, which could tolerate the impact of a 4 lb bird at a relative speed of 288 mph.	
135.	Flight Control Balancing and Deflection	Verify flight controls were balanced per the USAF maintenance manual(s) after material replacement, repairs, and painting. Verify proper rigging and deflection. In several former military aircraft, damage to flight controls has been noticed when inadequate repairs have been performed. If there are no adequate records of the balancing of the flight controls, the airworthiness certificate should not be issued.	
136.	Aileron Deformation and Boost Tabs	Inspect the ailerons before and after each flight and adequately address it in the AIP. This is important because air loads can result in aileron deformation. The AIP should also address the aileron boost tab systems. Also known as a force-sensitive aileron boost system. The A-37 is equipped with aileron boost tabs that are activated by the compression of a torsion bar. This is preloaded, and when exceeded, causes the tab to deflect and assisting the pilot in operating that flight control.	
137.	Thrust Attenuators	Verify proper condition, extension, and warning signage. These are very useful for controlling taxi speed and preserving brake life. Note: The attenuators are paddle-like devices hinged behind and to the inboard of the engine exhaust areas. When deployed, they direct exhaust to point sideways rather than aft, hence the "thrust attenuation" factor.	
138.	Air Brake	Verify proper condition, deflection, and warning signage of the air brake located under the nose. The AIP and SOPs should address the dangers that the air brake poses to ground personnel should also be addressed.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
139.	Slot Lip Spoilers	Verify proper condition, deflection, and warning signage of these devices. The AIP and SOPs should address the dangers that the spoilers pose to ground personnel should also be addressed.	
140.	Yaw Damper	Verify the yaw damper is addressed in the AIP.	
141.	Accurate Weight & Balance (W&B)	Review original W&B paperwork. Verify adherence to USAF guidance (including forms), as well as FAA-H-8083-1, Aircraft Weight and Balance Handbook, if documentation by the applicant appears to be inadequate. Several former military aircraft accidents have been linked to center of gravity miscalculations. Note: In the A-37, removal of military equipment may have an impact on the aircraft's W&B, especially in those cases where the equipment in question may not be properly documented in the W&B data. An example might be the Coors ceramic material wrapped in fiberglass under the seats and the 7/32 inch plate steel amour fitted around the cockpit.	
142.	Strain Gauges	Ensure strain gauges serviceable, per OLM MOD C-12-133-000/CD-049, if they are installed. If they are not serviceable, issue the appropriate group 6 limitations from FAA Order 8130.2.	
143.	"Experimental" Markings	Verify the word "EXPERIMENTAL" is located immediately next to the canopy railing, on both sides, as required by § 45.23(b). No subdued markings.	
144.	N-Number	Verify the marking required by §§ 45.25 and 45.29(b) concerning the registration number (N-number), its location, and its size are complied with. If non-standard markings are proposed, verify compliance with Exemption 5019, as amended, under regulatory Docket No. 25731.	
145.	Type of Ejection Seat System	Identify the type of ejection seat fitted to the aircraft. The type of seat changes many aspects of operations and maintenance. For example, A-37s are typically equipped with the Weber ejection seat, but early catapult fitted seats were (1980s) upgraded with a rocket assisted unit. Both types of seat, however, are of an earlier generation, and do not compare to more recent ejection seats, especially in terms of parts and serviceability.	
146.	Weber Aircraft Support	Ask the applicant whether the ejection seat OEM, Weber Aircraft (1) still supports the A-37 ejection seats, and (2) whether it control part supplies. It is critical to clearly understand if and how the OEM supports both the earlier or upgraded ejections seat. Note: The USAF supply chain is not available to civilian use.	
147.	Ejection Seat System Maintenance	Ensure maintenance and inspection of the ejection seat and other survival equipment is performed in accordance with the USAF applicable TOs by trained personnel. Include specific inspections and recordkeeping for pyrotechnic devices. Ejection seat system replacement times must be adhered to. No "on condition" maintenance may be permitted for rocket motors and propellants. Make the distinction between replacement times, that is, "shelf life" vs. "installed life limit." For example, a 9-year replacement requirement is not analogous to a 2-year installed limit. If such maintenance documentations and requirements are not available, the seat must be deactivated.	
148.	Ejection Seat Components Life-Limit	Ensure life-limit requirements concerning the Weber ejection seat are followed. The guiding documents include (1) *Specialized Storage and Maintenance Procedures – Rocket Catapult & Ballistic Catapult, T.O. 11P1-31-7,* (2) *Specialized Storage and Maintenance Procedures – Cartridge Actuated Thrusters, T.O. 11P6-1-7,* and (3) *Specialized Storage and Maintenance Procedures – Cartridges Actuated Initiators, T.O. 11P3-1-7.* No deviations or extensions should be permitted. If the seat is not properly maintained, including current pyrotechnics, it must be disabled. A 2001 A-37 accident in Peru was fatal in part because the ejection seat maintenance program in place did not have safeguards to ensure the ejection seat pyrotechnics were current. In that case, the pyrotechnics may have been over 2 years overdue. In a 2012 finding concerning a 2009 former military aircraft fatal accident, in which the pilot was killed because the ejection seat malfunctioned, it was found "the ejection seats explosive cartridges were found to be overdue at the time of the accident. The install life and shelf life interval of the cartridges expired. The evidence found indicated that the cartridges were installed on the ejection seat for approximately 8 to 10 years at the time of the accident. The install life was approximately 5 to 8 years overdue and well over the total in service life limit."	
149.	Ejection Seat System Maintainers Training	Require adequate ejection seat training for maintenance crews. On May 9, 2012, an improperly trained mechanic accidentally jettisoned the canopy of a former military aircraft while performing maintenance and was seriously injured.	
150.	Ejection Seat Modifications	Prohibit ejection seat modifications unless directly made by the manufacturer or permitted under USAF TOs.	
151.	Ground Support Equipment Maintenance	Verify the AIP provides for the proper maintenance of all required USAF-approved ground support equipment.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
A-37 Operating Limitations and Operational Issues			
152.	AIP and Related Documentation	Require adherence to the AIP and related documentation as part of the operating limitations.	
153.	Understanding of the Operating Limitations	Require the applicant to sign the Acknowledgment of Special Operating Limitations form.	
154.	A-37 Pilot in Command (PIC) Requirements	Refer to the appropriate plot training and checking requirements in FAA order 8900.1, Volume 5 Chapter 9, Section 2. As a matter of policy, the FAA requires a pilot have a total of 1,000 hours before they can be issued an authorization to act as PIC of an experimental jet unless they were trained by the U.S. military as a jet pilot. The A-37 is a multi-engine aircraft, and the appropriate rating is required. Also recommend a minimum of 10 hours of dual training in preparation for pilot authorization flight check. Recommend proficiency and currency of 3 hours per month and five takeoffs and landings. Note: The USAF restricted to two the number of aircraft types a pilot could hold currency on.	
155.	Flight Manuals	Ensure the PIC operates the aircraft as specified in the most current version of the flight manual (USAF manual, -1) for the A-37 version being flown.	
156.	Adequate Annual Program Letter	Verify the applicant's annual program letter contains sufficient detail and is consistent with applicable regulations and policies. (Many applicants/operators submit inadequate and vague program letters and fail to submit them on an annual basis.) Also verify the proposed activities (for example, an air show at a particular airport) are consistent with the applicable operating limitations (for example, avoiding populated areas) and do not pose a safety hazard, such as the runway being too short. There may be a need to review the proposed airports to be used.	
157.	A-37 Flight Manual Warnings, Cautions and Notes	Consider requiring review (before flight) of all A-37 flight manual warnings, cautions, and notes. Such a review will greatly enhance safety, especially in those cases where the PIC does not maintain a high level of proficiency in the aircraft. The following definitions apply to WARNINGs, CAUTIONs, and Notes found throughout this instruction. Warning: Explanatory information about an operating procedure practice, or condition, which may result in injury or death if not carefully observed or followed. Caution: Explanatory information about an operating procedure, practice, or condition, which may result in damage to equipment if not carefully observed or followed. Note: Explanatory information about an operating procedure, practice, or condition, which must be emphasized.	
158.	Foreign Aircraft Particularities and Restrictions	Verify whether the aircraft includes aircraft-specific restrictions in the form of "flight permit" and/or "difference data sheet" restrictions if it is of foreign origin. If those restrictions exist, the operator must understand those restrictions before flight, especially any post-restoration flight.	
159.	Maintenance and Line Support	Verify the aircraft is operated with qualified crew chief/plane captains, especially during preflight and post-flight inspections as well as assisting the PIC during startup and shutdown procedures. Note: A crew chief (USAF) or plane captain (U.S. Navy) is the person (a noncommissioned officer) who is in charge of the day-to-day operations, maintenance, and ground handling of an aircraft.	
160.	Ejection Seat System PIC Training	Require adequate ejection seat training for the PIC and crew, if applicable, for the type of seat installed. Note: Evidence shows the safety record of attempted ejections in civilian former military aircraft is very poor, typically indicating inadequate training leading to ejections outside of the envelope. The ejection envelope is a set of defined physical parameters within which an ejection may be successfully executed. It is primarily an interaction of two independent sets of parameters: the physically designed characteristics of the particular ejection system and the dynamics of the aircraft flight profile at the moment of ejection.	
161.	Ejection Seat System Ground Safety	Verify the safety of ejection seats on the ground. Verify ejection seats cannot be accidentally fired, including prohibiting untrained personnel from sitting on the seats. As NAVAIR states, "the public shall be denied access to the interior of all aircraft employing ejection seats or other installed pyrotechnic devices that could cause injury." In addition, operators should provide security during the exhibition of the aircraft to prevent inadvertent activation of the ejection system from inside or outside the aircraft by spectators or onlookers. The PIC on a recent Jet Warbird operation noted: "Recently we had a case where a guest in the back jettisoned the rear canopy on the ground at the parking position while trying to lock the canopy with the lever on the R/H side… The canopy went straight up for 6 m (20 ft) and fell back on the ground, right in front of the left wing leading edge next to the rear cockpit (fortunately not straight back on the cockpit to punish the guy)." Note: Any ejection seat training must include survival and Post Bailout Procedures, either based on U.S. Navy's or USAF's training (or NATO) appropriate for the equipment being used. Note: As a result of accidents, the public is not allowed to sit on armed ejection seats as DOD policy.	

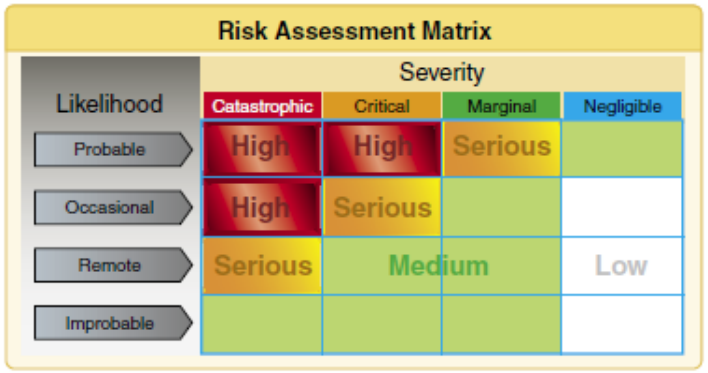
Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
162.	Ejection Seat System Safety Pins	Require the PIC to carry the aircraft's escape systems safety pins on all flights and high-speed taxi tests. As a recommendation stemming from a fatal accident, the U.K. CAA may require "operators of civil registered aircraft fitted with live ejection seats to carry the aircraft's escape systems safety pins (a) on all flights and high speed taxi tests (b) in a position where they are likely to be found and identified without assistance from the aircraft's flight or ground crews."	
163.	Parachutes	Comply with § 91.307, Parachutes and Parachuting. This regulation includes parachute requirements: (1) the parachute be of an approved type and packed by a certificated and appropriately rated parachute rigger, and (2) if of a military type, the parachute must be identified by an NAF, AAF, or AN drawing number, an AAF order number, or any other military designation or specification number. The parachute must also be rated for the particular ejection seat being used.	
164.	Engine Operating Limits	Adhere to all engine limitations in the applicable USAF flight manuals.	
165.	Spool Down Time	Verify the AIP incorporates action(s) following a change in the spool down time of the J85-17A engine after shutdown. This is critical as it could be an indicator of an upcoming problem with the engine.	
166.	External Stores	Prohibit the installation of external stores to the wing that were not approved by the manufacturer or the military operator and limit those to external fuel tanks. No external stores may have an in-flight release mechanism. This is applicable to the approved stations for external fuel tanks. This is important because the A-37 has a history of malfunctioning pylons and inadvertent in-flight separation of external stores. In FAA Order 8130.2, only aircraft certificated for the purpose of R&D may be eligible to operate with functional jettisonable external fuel tanks or stores, but the safety of people and property on the ground still has to be addressed. As the NTSB stated in 2012 following the fatal accident of a high-performance experimental aircraft, "the fine line between observing risk and being impacted by the consequences when something goes wrong was crossed." In many cases, and although "the pilots understood the risks they assumed; the spectators assumed their safety had been assessed and addressed," and it was not.	
167.	Asymmetric Wing Mounted Stores	Prohibit asymmetric wing-mounted equipment regardless of the applicable -1 manual. The dangers of asymmetric loading can best be illustrated by the 1994, a USAF O/A-37B crashed during testing when a valve failure in the fuel system allowed fuel to remain in the right wingtip tank, creating an asymmetric condition. The jet entered the spin, but both pilots ejected safely.	
168.	Known Fuel Imbalance	Prohibit the operation of an aircraft with a known fuel imbalance (including fuel transfer problems), and if one occurs in flight, the aircraft and the issues can not be corrected in flight, the aircraft is to land as soon as practicable and following the guidance in the Flight Manual. Also, recommend that only inboard pylons be used for external loads.	
169.	Emergency Stores Release Handle	Disable the Emergency Stores Release Handle (ESRH).	
170.	Master Armament Switch	Disable and disconnect the Master Armament Switch from any system. Weapon-related buttons (bomb/rocket button, trigger) on the control stick grip must also be disabled and disconnected from all systems.	
171.	Restrict Acrobatics	Restrict acrobatics per the appropriate flight manual.	
172.	Mach Meter and Airspeed Calibration	Require the installation and calibration of a Mach meter or verify the PIC makes the proper Mach determination before flight. Unless the airspeed indicator(s) is properly calibrated, transonic range operations may have to be restricted.	
173.	Accelerometer	Ensure the aircraft's accelerometer is functional. This instrument is critical to remain within the required G limitation of the aircraft.	
174.	High-Speed Controllability	Recommend limiting transonic operations by 10 percent below MMO. This provides a good safety margin and could be addressed in the operating limitations, the AFM, and related standard operating procedures (SOP). MMO is the maximum operating limit speed (V_{MO} / M_{MO} airspeed or Mach Number, whichever is critical at a particular altitude) is a speed that may not be deliberately exceeded in any regime of flight (climb, cruise, or descent).	
175.	Phase I Flight Testing	Recommend, at a minimum, all flight tests and flight test protocol(s) follow the intent and scope of acceptable USAF/U.S. Navy functionality test procedures. The aircraft needs detailed Phase I flight testing for a minimum of 10 hours. Returning a high-performance aircraft such as the A-37 to flight status after restoration cannot be accomplished by a few hours of "flying around." Safe operations also require a demonstrated level of reliability.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
176.	Post-Maintenance Check Flights	Recommend post-maintenance flight checks be incorporated in the maintenance and operation of the aircraft and TO 1-1-300, Maintenance Operational Checks and Flight Checks, June 15, 2012, be used as a reference.	
177.	Flight Over Populated Areas	Prohibit flights over populated areas, including takeoffs and landings, if the ejection seat is functional. If not, the aircraft may be operated over populated areas for the purpose of takeoff and landing only, and only in Phase II operations. The area on the surface described by the term "only for the purpose of takeoff and landing" is the traffic pattern. For the purpose of this limitation, the term "only for the purpose of takeoff and landing" does not allow multiple traffic patterns for operations such as training or maintenance checks. As the NTSB stated in 2012 following the fatal accident of a high-performance experimental aircraft, "the fine line between observing risk and being impacted by the consequences when something goes wrong was crossed." In many cases, and although "the pilots understood the risks they assumed; the spectators assumed their safety had been assessed and addressed," and it was not. In Australia, where several A-37s operated, the ATSB noted "the …Cessna A-37… operate in and out of Bankstown on a regular basis. This is a high population density area. Operations on many occasions are in contravention of the risk index contained in AC 21.25. There have been several incidents, including runway excursions. This is a risk to the public. There are several schools, clubs, shopping centers and a hospital in the area. These are aging aircraft and generally not being operated or maintained as the original military operator did or the manufacturer intended. These aircraft are the hobby end of the spectrum and should be restricted to operation in remote, low population density areas. The public around airports such as Bankstown and operators of type certified aircraft sharing the same airspace, should not be exposed to the obvious risks (refer CAR 262AM). Warbirds are being flown in and out of a densely populated area on revenue flights and are being operated and maintained by inexperienced personnel. The original intention was to allow these aircraft to be operated as air show display aircraft, not to be engaged in commercial operations. Considering the number of accidents sustained by warbirds in relation to the number of hours flown, this matter is of serious concern." http://www.atsb.gov.au/media/56951/fsa_0300.pdf.	
178.	G Limitations	Consider G limits. A limit of 4Gs (6 is maximum), and -1G (-2 is maximum) should be considered. There is no justification to take the aircraft anywhere near its original limitations. The fact that the aircraft could be loaded to 6 Gs does not mean such performance should be attempted or is inherently safe. This is especially true, taking into account the aircraft's age and historical use.	
179.	Visual Meteorological Condition (VMC) and Instrument Flight Rules (IFR) Operations	Recommend only day VMC operations. If IFR operations are permitted, prohibit operations in known icing conditions—aircraft is not properly equipped for icing conditions. Comply with § 91.205.	
180.	Carrying of Passengers §91.319(a)(2)	Prohibit the carrying of passengers (and property) for compensation or hire at all times. For hire flight training is permitted only in accordance with an FAA-issued letter of deviation authority (LODA). FAA LODA policy limits training to pilots eligible for A-37 experimental aircraft authorization.	
181.	Passenger Training and Limitations	Implement adequate training requirements and testing procedures if a person is carried on the right-hand seat [refer to above for limitations under §91.319(a)(2)] to allow the performance of that crew's position responsibilities per the applicable Crew Duties section of the USAF Flight Manual. This training should not be a simple check out, but rather a structured training program (for example, ground school on aircraft systems, emergency and abnormal procedures, "off-limits" equipment and switches, and actual cockpit training). The right seat qualification should also include (1) ground egress training (FAA approved ejection seat training), (2) ejection seat and survival equipment training, (3) abnormal/emergency procedures, and (4) normal procedures. In addition to any aircraft specific (that is, systems and related documentation) training, we recommend that the *Naval Aviation Survival Training Program* (Non-aircrew NASTP Training) or/and *the United States Air Force Aerospace Physiology Program* (AFI 1 I-403, Aerospace Physiological Training Program) be used in developing these programs. In addition, passenger physiological and high-altitude training should be implemented for all operations above 18,000 ft. This issue can be addressed as part of the operating limitations by requiring the right seat training and incorporating the adequate reference (name) of the operator's training program.	
182.	Spins	Prohibit spins. The T-37 has spin characteristics that resulted in the USAF incorporating them into training. It is not so for the A-37. Note: Concerning spins in the T-37, the USAF determined some of the older T-37's were so "out of rig," they were unrecoverable from a spin, so any spinning was ultimately prohibited.	
183.	Intentional Single-Engine Operations	Prohibit intentional single-engine operations (that is, to save fuel and increase endurance). Any loss of engine power should be treated as an emergency. Although the A-37B had outwards and downwards engine thrust lines compared to the basic T-37 design, and this was done to ease single-engine control, the sanctioned single-engine operations may have been acceptable for combat or mission requirements, there is no safety justification for such practices in civil use. This is especially true where single-engine operations resulted in a sideways vector because the rudder trim is not enough to cover the generated yaw.	
184.	Reduce Vertical Separation Minimums (RVSM)	Prohibit operations above RVSM altitudes (FL290).	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
185.	High-Altitude Training	Recommend the PIC complete an FAA-approved physiological training course (for example, altitude chamber). Refer to FAA Civil Aerospace Medical Institute (CAMI) Physiology and Survival Training website for additional information.	
186.	Minimum Equipment for Flight	Ask the applicant to specify minimum equipment for flight and develop such a list consistent with the applicable USAF requirements and § 91.213.	
187.	Post-Flight and Last Chance Check Procedures	Recommend the establishments of post-flight and last chance inspection per USAF guidance. Note: Last chance checks may include coordination with the airport and ATC for activity in the movement areas.	
188.	Minimum Runway Length	Recommend a minimum runway length of 4,500 ft. In addition, ensure the PIC verifies, using the appropriate aircraft performance charts (the USAF TO 1A-37B-1-1 Performance Supplement), sufficient runway length is available considering field elevation and atmospheric conditions. To add a margin of safety, use the following: <u>For Takeoff</u> • No person may initiate an airplane takeoff unless it is possible to stop the airplane safely on the runway, as shown by the accelerate-stop distance data, and to clear all obstacles by at least 50 ft vertically (as shown by the takeoff path data) or 200 ft horizontally within the airport boundaries and 300 ft horizontally beyond the boundaries, without banking before reaching a height of 50 ft (as shown by the takeoff path data) and after that without banking more than 15 degrees. • In applying this section, corrections must be made for any runway gradient. To allow for wind effect, takeoff data based on still air may be corrected by taking into account not more than 50 percent of any reported headwind component and not less than 150 percent of any reported tailwind component. <u>For Landing</u> • No person may initiate an airplane takeoff unless the airplane weight on arrival, allowing for normal consumption of fuel and oil in flight (in accordance with the landing distance in the AFM for the elevation of the destination airport and the wind conditions expected there at the time of landing), would allow a full stop landing at the intended destination airport within 60 percent of the effective length of each runway described below from a point 50 ft above the intersection of the obstruction clearance plane and the runway. For the purpose of determining the allowable landing weight at the destination airport, the following is assumed: o The airplane is landed on the most favorable runway and in the most favorable direction, in still air. o The airplane is landed on the most suitable runway considering the probable wind velocity and direction and the ground handling characteristics of that airplane, and considering other conditions such as landing aids and terrain.	
189.	Runway Considerations	Consider accelerate/stop distances, balanced field length, and critical field length in determining acceptable runway use per Classic Jet Aircraft Association (CJAA) guidance. To enhance A-37 operations, it is recommended takeoff procedures similar to the USAF minimum acceleration check speed (using a ground reference during the takeoff run to check for a pre-calculated speed) be adopted.	
190.	Jet Exhaust Dangers	Establish adequate jet blast safety procedures per TO 1A-37B-1-1.	
191.	Servicing and Flight Servicing Certificate	Ensure the applicant verifies ground personnel are trained for A-37 operations with an emphasis on the potential for fires during servicing. Prohibit non-trained personnel from servicing the aircraft. Recommend a Flight Servicing Certificate or similar document be used by the ground personnel to attest to the aircraft's condition (that is, critical components such as tires) before each flight to include the status of all servicing (that is, liquid levels, fuel levels, hydraulic fluid, and oxygen). Specific servicing areas in the A-37 include: oxygen tanks and filler, fuel fillers (4), engine oil tank, brake control unit, batteries, external power receptacle, rain removal system, single-point refueling (needs to be disabled), emergency air bottle and filler, and hydraulic reservoir.	
192.	Ground Support Equipment	Verify all required ground equipment is available and in a serviceable condition.	
193.	Aerial Target Towing	Restrict all towing. Notwithstanding the standard language in the FAA Order 8130.2 limitations concerning towing, the A-37 is not to be used for towing targets because such operations pose a danger to property and people on the ground and endanger the aircraft.	
194.	Hot and Pressure Refueling	Prohibit hot and pressure refueling. There are too many dangers with these types of operations.	
195.	Personal Flight Equipment	Recommend the operator use the adequate personal flight equipment and attire to verify safe operations. This includes a helmet, oxygen mask, fire retardant (Nomex) flight suit, gloves (that is, Nomex or leather), adequate foot gear (that is, boots), and clothing that does not interfere with cockpit systems and flight controls. Operating with a live ejection seat requires a harness. Therefore, recommend only an approved harness compatible with the ejection seat be used.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
196.	ARFF Coordination	Coordinate with Aircraft Rescue and Fire Fighting (ARFF) personnel at any airport of landing. A safety briefing should be provided and include: ejection seat system, overview; making ejection seat safe, including location and use of safety pins; canopy jettison; fuel system, fuel tanks; intake dangers, engine shut-of- throttle, fuel, batteries; flooding the engines; fire access panels, and hot exhaust ports; and crew extraction-harness, oxygen, communications, and forcible entry. ARFF personnel should be provided with the relevant sections of the aircraft -1 (AFM) and other appropriate references like Fire Fighting and Aircraft Crash Rescue, Vol. 3, Air University, Maxwell AFB, 1958. There is additional documentation to address the issues associated with the potential crash of an aircraft like the A-37. An additional reference is *NATOPS U.S. NAVY Aircraft Firefighting and Rescue Manual*, NAVAIR 00-80R-14, 15 OCTOBER 2003. The FAA maintains a series of Advisory Circulars that provide guidance for Crash Fire Rescue personnel. Refer to AC 5210-17 Programs for Training of Aircraft Rescue and Firefighting. Note: On November 1, 2012, the NTSB issued Safety Recommendation A-12-64 through -67. The NTSB recommends that FAA require the identification of the presence and type of safety devices (such as ejection seats) that contain explosive components on the aircraft. It further stated that that information should be readily available to first responders and accident investigators by displaying it on the FAA's online aircraft registry and that the FAA should issue and distribute a publicly available safety bulletin to all 14 CFR part 139-certificated airports and to representative organizations of off-airport first responders, such as the International Association of Fire Chiefs and the National Fire Protection Association, to (1) inform first responders of the risks posed by the potential presence of all safety devices that contain explosive components (including ejection seats) on an aircraft during accident investigation and recovery and (2) offer instructions about how to quickly obtain information from the FAA's online aircraft registry regarding the presence of these safety devices that contain explosive components on an aircraft.	
197.	ATC Coordination	Coordinate with ATC before any operation that may interfere with normal flow of traffic to ensure the requirement to avoid flight over populated areas is complied with. Note: ATC does not have the authority to waive any of the operating limitations or operating rules.	
198.	Air Refueling	Prohibit air-refueling and ensure the in-flight refueling probe is disabled. Besides the inherent dangers of air refueling and the fact that the levels of proficiency for such activities can hardly be maintained by civilian pilots, the A-37 air refueling system, in part due to the lack of pressurization, creates serious safety concerns. For example, a bad disconnect or a leaking basket could result in fuel entering the cockpit.	
199.	Formation Takeoffs and Landings	Prohibit formation takeoffs and landings. There is no civil use, including display, to justify the risks involved.	
200.	Military/Public Aircraft Operations	Require the operator to obtain a declaration of PAO from the contracting entity or risk civil penalty for operating the aircraft outside the limits of the FAA experimental certificate. Some A-37 operators may enter into contracts with the U.S. Department of Defense (DOD) to provide military missions such as air combat maneuvering (ACM), target towing, and electronic counter measures (ECM). Such operations constitute public aircraft operations (PAO), not civil operations under FAA jurisdiction. Verify the operator understands the differences between PAOs and operations under a civil certificate. For example, the purpose of an airworthiness certificate in the exhibition category is limited to activities listed in § 21.191(d). Note: The following notice, which was issued by AFS-1 in March 2012, needs to be communicated to the applicant: "Any pilot operating a U.S. civil aircraft with an experimental certificate while conducting operations such as air-to-air combat simulations, electronic counter measures, target towing for aerial gunnery, and/or dropping simulated ordinances is operating *contrary* to the limits of the experimental certificate. Any operator offering to use a U.S. civil aircraft with an experimental certificate to conduct operations such as air-to-air combat simulations, electronic counter measures, target towing for aerial gunnery, and/or dropping simulated ordinances pursuant to a contract or other agreement with a foreign government or other foreign entity would not be doing so in accordance with any authority granted by the FAA as the State of Registry or State of the Operator. These activities are not included in the list of experimental certificate approved operations and may be subject to enforcement action by FAA. For those experimental aircraft operating overseas *within* the limitations of their certificate, FAA Order 8130.2, section 7, paragraph 4071(b) states that if an experimental airworthiness certificate is issued to an aircraft located in or outside of the United States for time-limited operations in another country, the experimental airworthiness certificate must be accompanied by appropriate operating limitations that have been coordinated with the responsible CAA *before* issuance." For additional information on public aircraft status, refer to 76 FR 16349, Notice of Policy Regarding Civil Aircraft Operators Providing Contract Support to Government Entities (Public Aircraft Operations), dated March 23, 2011.	
201.	TO 00-80G-1 and Display Safety	Recommend using TO 00-80G-1, Make Safe Procedures for Public Static Display, dated November 30, 2002, in preparing for display of the aircraft. This document addresses public safety around aircraft in the air show/display environment. It covers hydraulics, egress systems, fuel, arresting hooks, electrical, emergency power, pneumatic, air or ground launched missiles, weapons release (including inert rounds), access panels, antennae, and other equipment that can create a hazard peculiar to certain aircraft.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
A-37 Aircraft Flight Manual (AFM), SOPs, and Best Practices			
202.	Operational Risk Management (ORM)	Recommend an ORM-like approach be implemented by the A-37 owner/operator. ORM employs a five-step process: (1) Identify hazards, (2) Assess hazards, (3) Make risk decisions, (4) Implement controls, and (5) Supervise. The use of ORM principles will go a long way in enhancing the safe operation of A-37 aircraft. ORM is a systematic, decision making process used to identify and manage hazards. ORM is a tool used to make informed decisions by providing the best baseline of knowledge and experience available. Its purpose is to increase safety by anticipating hazards and reducing the potential for loss. The ORM process is utilized on three levels based upon time and assets available. These include: (1) Time-critical: A quick mental review of the five-step process when time does not allow for any more (that is, in-flight mission/situation changes), (2) Deliberate: Experience and brain storming are used to identify hazards and is best done in groups (that is, aircraft moves, fly on/off), (3) In-depth: More substantial tools are used to thoroughly study the hazards and their associated risk in complex operations. The ORM process includes the following principles: Accept no unnecessary risk, anticipate and manage risk by planning and make risk decisions at the right level. The following Air Force press release is a ORM-based analysis of a 2011 jet trainer accident: "*CULTURE OF RISK TOLERANCE' CITED IN CRASH PROBE* - 9/1/2011 - RANDOLPH AIR FORCE BASE, Texas -- Investigators found that the Feb. 11 crash landing at Ellington Field, Texas, resulted from a series of mistakes by a fatigued pilot during landing, and they admonished the pilot's squadron for creating a 'culture of risk tolerance.' The pilot, from the 14th Flying Training Wing at Columbus Air Force Base, Miss., became disoriented and misjudged the landing runway, lost altitude too quickly and allowed his airspeed to fall below a safe level, according to the Air Education and Training Command accident investigation report. This resulted in catastrophic damage to the [aircraft's] landing gear and right wing. The mishap occurred during the fourth sortie of the day as a night solo continuations-training mission into Ellington Field, near Houston, on a squadron cross-country sortie. The pilot safely departed the aircraft when it came to rest on the ground, and he sustained only minor injuries. In addition to the culture of risk tolerance, the report cited inadequate operational risk management of the cross-country weekend plan. 'Inappropriate supervisory policy, combined with inadequate ORM, led to the mishap pilot flying a high-risk mission profile,' the report said. The board further found that the pilot's fatigue, resulting from the aggressive flight plan approved by his squadron, substantially contributed to the mishap. 'Outside of these cross-country weekends, it was rare for an (instructor pilot) to fly four sorties in one day. There was a mindset that a day consisting of four continuation training sorties was generally less risky than a day consisting of three student pilot instructional sorties,' the report said. 'The sortie was (the mishap pilot's) fourth sortie of the day and was flown entirely at night... This mishap was caused by the authorization and execution of a mission having an unnecessarily high level of risk relative to the real benefits.' Damage to the [aircraft] -- landing gear, engines, right wing and tail section -- was assessed at $2.1 million. The impact also caused minor damage to the runway, but no damage to private property, the report said. According to Col. Creig A. Rice, AETC director of safety, risk mitigations were put in place to address the issues outlined in the accident investigation report." See http://www.torch.aetc.af.mil/news/story.asp?id=123277394.	
203.	System Safety MIL-STD-882B	Recommend the use of System Safety Program Requirements-MIL-STD-882B in the operation of A-37 aircraft. This guidance is also useful in the maintenance and operation of high-performance former military aircraft. It covers program management, risk identification, audits, and other safety related practices.	
204.	Cockpit Resource Management (CRM) and SRM Single-Pilot Resource Management (SRM).	Recommended that the applicant and operator adopt a CRM-type program for A-37 operations. While CRM focuses on pilots operating in crew environments, many of the concepts apply to single-pilot operations. Many CRM principles have been successfully applied to single-pilot aircraft, and led to the development of SRM. SRM is defined as the art and science of managing all the resources (both on-board the aircraft and from outside sources) available to a single pilot (prior and during flight) to ensure that the successful outcome of the flight. SRM includes the concepts of Risk Management (RM), Task Management I, Automation Management (AM), Controlled Flight Into Terrain (CFIT) Awareness, and Situational Awareness (SA). SRM training helps the pilot maintain situational awareness by managing the automation and associated aircraft control and navigation tasks. This enables the pilot to accurately assess and manage risk and make accurate and timely decisions. Integrated CRM/SRM incorporates the use of specifically defined behavioral skills into aviation operations. Standardized training strategies shall be used in such areas as academics, simulators, and flight training. Practicing CRM/SRM principles will serve to prevent mishaps that result from poor crew coordination. At first glance crew resource management for the single pilot might seem paradoxical – but it is not. While multi-pilot operations have traditionally been the focus of CRM training, many elements are applicable to the single pilot operation. Aircraft owners and Pilots Association's (AOPA) Flight Training described single-pilot CRM as to be "found in the realm of aeronautical decision making, which is simply a systematic approach that pilots use to consistently find the best course(s) of action in response to a given set of circumstances." Wilkerson, Dave. September 2008. From a U.S. Navy stand point, OPNAVINST 1542.7C Crew Resource Management Program, dated October 12, 2001, can be used as guidance. Also see CRM For the Single Pilot. *Vector* (May/June 2008). FAA guidance includes: Summers, Michele M., Ayers, Frank Ayers, Connolly, Thomas Connolly, and Robertson, Charles. Managing Risk through Scenario Based Training, Single Pilot Resource Management, and Learner Centered Grading, 2007, and Chapter 17, Airplane Flying Handbook. Print. Airplane Flying Handbook FAA-H-8083-3A.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
205.	Risk Matrix and Risk Assessment Tool	Recommend using a risk matrix in mitigating risk in A-37 operations. A risk matrix can be used for almost any operation by assigning likelihood and consequence. In the case presented, the pilot assigned a likelihood of occasional and the severity as catastrophic. As one can see, this falls in the high risk area. The risk assessment tool in Figure 17-5, chapter 17, Airplane Flying Handbook, FAA-H-8083-3A.  Source: FAA	
206.	AFM Addendums	Consider additions or restrictions to the AFM. Operational restrictions should be also addressed in the AFM.	
207.	A-37 Air Force Instructions (AFI)	Recommend the applicable USAF AFI for the A-37 and OA-37 be used as an integral part of the operation of the aircraft.	
208.	In-Flight Canopy Separation	Revise the pilot checklist and right-hand-seat occupant briefing to emphasize (that is, “warning—caution”) the proper closing of the canopy.	
209.	V_{ne} of 10 Percent Under MMO and Transonic Operations	Recommend limiting transonic operations by 10 percent below MMO. This provides a good safety margin and could be addressed in the operating limitations, the AFM, and related standard operating procedures (SOP). In the A-37, at Mach 0.70 is the limit. Above that speed, the nose tucks down, the stall goes across the horizontal stabilizer, and the pilot has no elevator control. As a result, the pilot may be unable to pull of a dive he or she may have started. As an A-37 pilot noted, “no one ever exceeded critical Mack in an A-37B and pulled out of it.” Door, *Air Combat*, 2006.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
210.	Fuel Mismanagement	Require special emphasis on fuel starvation and fuel management. The aircraft has a complex fuel system. For example, the internal fuel system for the A-37B had six inter-connected cells in each wing and a single-fuselage tank. It also includes a pair of 90-gallon wingtip tanks, plus provisions for 100-gallon tanks on the two most inboard pylons.	
211.	Speed Limitations Due To Avionics and Other Equipment	Verify the speed limit of the aircraft. Some A-37 operators may install certain types of avionics with speed limitations.	
212.	External Tank(s) Failure	Restrict external tanks to only those cleared by the USAF. Adhere to the drop tank limitations related to (1) takeoff and landing performance, (2) G limits, (3) airspeed, and (4) fuel in the tanks. There should not be any means of jettisoning these tanks while on the ground or in flight. There should not be any modifications to the drop tanks.	
213.	Command Ejection	Ensure SOPs address the command ejection issue, that is, who initiates the ejection and under what circumstances, as per USAF guidance, before the flight if the right-hand seat is occupied.	
214.	Single-Engine Handling	Ensure SOPs emphasize single-engine emergencies and handling. Note: The A-37 engines were canted slightly outward and downward to improve single-engine handling.	E
215.	Oxygen Check	Recommend SOPs and training require, before every flight, the pilot to perform the "PRICE" check on the oxygen equipment (PRESSURE, REGULATOR, INDICATOR, CONNECTIONS and EMERGENCY) if a pressure oxygen system is installed. The acronym PRICE is a checklist memory-jogger that helps pilots and crewmembers inspect oxygen equipment. Mix and match components with caution. When inter-changing oxygen systems components, ensure compatibility of the components-storage containers, regulators, and masks. This is a particularly important issue because the A-37's old age may very well require the use of modern equipment, at least some components.	
216.	Spool Down Time	Ensure SOPs incorporate noting the spool down time of the J85-17A engine after shutdown. This is critical as it could be an indicator of an upcoming problem with the J85 engine.	
217.	Specific Range	Recommend SOPs address minimum landing fuel. Verify actual aircraft-specific range (nautical air miles traveled per pound of fuel used).	
218.	Bingo and Minimum Landing Fuel	Recommend establishing SOPs addressing minimum landing fuel for IFR operations as provided in § 91.151, Fuel Requirements for Flight in VFR Conditions, in addition to § 91.167, to add a level of safety. In addition, a "Bingo" fuel status (a re-briefed amount of fuel for an aircraft that would allow a safe return to the base of intended landing) should be used in all flights. Note: Bingo fuel and minimum landing fuel are not necessarily the same in that a call for Bingo fuel and an RTB still required managing the minimum landing fuel.	
219.	Suspected Flight Control Failure	Recommend establishing SOPs for troubleshooting suspected in-flight control failures, that is, specific checklist procedures, altitude, and clear location.	
220.	FAA AC 91-79	Recommend the use of FAA AC 91-79, Runway Overrun Prevention. According to AC 91-79, safe landings begin long before touchdown. Adhering to SOPs and best practices for stabilized approaches will always be the first line of defense in preventing a runway overrun.	
221.	FAA AC 61-107	Recommend the use of FAA AC No. 61-107 Operations of Aircraft at Altitudes Above 25,000 ft MSL and/or Mach Numbers (MMO) Greater Than 0.75. This AC can be used to assist pilots who are transitioning from aircraft with less performance capability to complex, high-performance aircraft that are capable of operating at high altitudes and high airspeeds (like the A-37). It also provides knowledge about the special physiological and aerodynamic considerations involved in these kinds of operations.	
222.	360º Overhead Pattern Technique	Recommend the operator consider implementing SOPs to refrain from 360º overhead patterns. There is no civil application of this technique.	
223.	Outdoors	Recommend establishing SOPs to address the aircraft's sensitivities to weather, including hydraulic seal failures and leakages, freezing moisture, transparencies, air intake, and exhaust protection is necessary.	

Issue#	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
224.	Reporting Malfunctions and Defects	Ask the applicant/operator to report incidents, malfunctions, and equipment defects found in maintenance, preflight, flight, and post-flight inspection. This would yield significant safety benefits to operators and the FAA. A 2011 study for the U.S. Navy points to the effectiveness of such practices. It stated: "The data analysis carried out was a comprehensive attempt to examine the strength of the link between safety climate and mishap probability. Our findings would seem to support the premise that safety climate and safety performance are, at best, weakly related. Mishaps are rare events, and they describe only part of the spectrum of risks pertaining to a work system. We suggest that measuring workers' self-reported safety attitudes and behavior is an alternative way to assess the discriminate validity of safety climate." O'Connor, October 2011. In other words, reporting safety issues, such as malfunctions, go a long way in preventing an accident.	
225.	Fuel Transfer	Give special interest to the fuel transfer system in the A-37, within the context of fuel mismanagement, especially when equipped with multiple external fuel tanks. SOPs should emphasis this. See *Known Fuel Imbalance,* above.	
226.	Cockpit Familiarization	Recommend detailed and comprehensive SOPs/training (not unlike the military-style training known as "blindfold cockpit check with boldface items" conducted in a cockpit or cockpit simulator) be instituted to ensure adequate cockpit familiarization for the PIC.	
227.	Simulated Emergencies	Permit simulated emergencies only in accordance with the A-37 USAF -1 Flight Manual, including emergency and abnormal checklists and in accordance with the limitations issued by the FAA for the aircraft.	
228.	High-G Training	Recommend the PIC and any occupants received training, including techniques to mitigate the potential effects of [high-G] exposure if operations above 3 Gs are contemplated.	
229.	Medical Fitness for Ejection Seats	Recommend that applicant/operator consider aircrew medical fitness as part of flight qualifications and preparation. In addition to meeting any ejection seat limitations (i.e., weight and height), and seat-specific training, relevant US military medical fitness standards could be used to ensure that survival after ejection is maximized and injuries minimized. Ejection records show that when survivable, many ejections inflict serious injuries. Examples of Aeromedical guidance include *Medical Examinations and Standards,* Aerospace Medicine, Air Force Instruction 48-123, 22 MAY 2001 *and Standards of Medical Fitness*, Army Regulation 40-501, June 14, 1989. See Also see Defense and Civil Institute of Environmental Medicine, Department of National Defense, Canada. *Ejection Systems and the Human Factors: A Guide for Flight Surgeons and Aeromedical Trainers*, May 1988.	
230.	49 CFR 830	Ask applicant/operator to adopt open and transparent SOPs that promote the use and requirements of 49 CFR 830, Notification And Reporting Of Aircraft Accidents or Incidents and Preservation of Aircraft Wreckage, Mail, Cargo, and Records, because there have been so many instances where accidents and incidents are not reported, hindering safety. Occurrences, which are events, other than an accident or incident (that requires investigation by the Flight Standards Service for its potential impact on safety) should also be reported. Occurrences include the following when no injury, damage, or 49 CFR 830.5 reporting requirements are involved: (1) aborted takeoffs not involving a runway excursion, (2) air turn backs where the aircraft returns to the departure airport and lands without incident, and (3) air diversions where the aircraft diverts to a different destination for reasons other than weather conditions. Reference should be made of FAA Order 8020.11 *Aircraft Accident and Incident Notification, Investigation, and Reporting*.	
231.	NATO Aviation Safety Guidance	Recommend the relevant sections of *Aviation Safety* AFSP-1(A), NATO, March 2007, be incorporated into the appropriate operational aspects of the A-37 operations to enhance overall safety. This document, which incorporates many safety issues concerning the safe operation of combat aircraft, sets out aviation safety principles, policies and procedures-in particular those aimed at accident prevention. This document is a basic reference for everybody involved in aviation safety, both in occurrence prevention-starting from the development, testing and introduction of material and procedures-and in its aftermath-the determination of the causes of an occurrence and the implementation of measures to prevent its recurrence. It is also recommended that this process include internal safety audits. Safety audits help identify hazards and measure compliance with safety rules and standards. They assist in determining the adequate condition of work areas, adherence to safe work practices, and overall compliance with safety-based and risk-reduction procedures.	
232.	Aircrew Records	Recommend the applicant/operator establish and maintain processes to address aircrew qualifications and records. This could include: pilot certification; competency; ground and flight training (records, instructors, conversion training, command training, and proficiency); medical; duty time; and flight time records.	
233.	Type Clubs or Organizations	Recommend the applicant/operator join a Cessna A-37/T-37 type club or organization. This facilitates safety information collection and dissemination.	
234.	Emergency Planning and Preparedness	Recommend the applicant/operator institute emergency plans and post-accident management SOPs that ensure the consequences of major incidents and accidents to aircraft are dealt with promptly and effectively.	

Page Intentionally Left Blank

Attachment 4 - Additional Resources and Recommendations

Additional Resources

- Accident USAF data (T-37, A-37, and O/A-37). Other data, notably from the Chilean and Uruguayan Air Forces may be available.
- Air Force Recurring Publication 91-1, *USAF Flying Safety* magazine.
- USAF Air Force Instructions (AFI) for the A-37 and OA-37.
- Australia's CAAP 30-3(0), *Approved Maintenance Organization (AMO) — Limited Category Aircraft*, Civil Aviation Advisory Publication, December 2001. This publication addresses the restoration and maintenance of ex-military aircraft and is an excellent guide for developing adequate aircraft maintenance and inspection programs.
- CAP 632, *Operation of Permit to Fly Ex-Military Aircraft on the UK Register*. This is a comprehensive source of information and guidance on topics like technical requirements, specialist equipment and systems, pilot/crew qualification, operational requirements, records and oversight procedure, and safety management.
- Chamberlain, H. Dean. FAA News, *Armed and Dangerous*, November/December 2003.
- *CJAA Safety Operations Manual*. June 30, 2008.
- COMNAVAIRFORINST 4790.2A, Chapter 16, *Intermediate Level (I-Level) Maintenance Data System (MDS) Functions, Responsibilities, and Source Document Procedures*, CH-2 10, November 2009.
- Defense and Civil Institute of Environmental Medicine, Department of National Defense, Canada. *Ejection Systems and the Human Factors: A Guide for Flight Surgeons and Aeromedical Trainers*, May 1988.
- *Dictionary of Military and Associated Terms.* Department of Defense, JCS Pub. 1, September 1974.
- Drury, Colin G. and Watson, Jean (FAA). *Human Factors Good Practices in Borescope Inspection*, 2001.
- FAA. AC 5220-9, *Aircraft Arresting Systems.*
- FAA. AC 150/5300-13, *Airport Design*.
- FAA. AC 150/5220-22, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*.
- See FEDERAL FIREARMS REGULATIONS REFERENCE GUIDE, ATF Publication 5300.4, Revised September 2005.
- Morris, Greg. EAA Warbirds of America. Warbirds (magazine), *Warbird Airmanship*, March 2009.
- NATO. AFSP-1(A), *Aviation Safety*, March 2007.
- NATOPS. OPNAVINST 3710.7U, *General Flight and Operating Instructions*, November 23, 2009.
- NAVAIR 00-80R-14, *U.S. Navy Aircraft Firefighting and Rescue Manual*, October 15, 2003.
- NAVAIR 00-80T-109, *Aircraft Refueling NATOPS Manual*, June 15, 2002.
- *Naval Aviation Maintenance Program Standard Operating Procedures* (NAMPSOPs), chapter 10.
- NAVPERS 00-8-T-80, *Aerodynamics for Naval Aviators*, January 1965.
- New Zealand Civil Aviation Authority. AC 43-21, *Escape and Egress Systems*, December 25, 1997.

- Safety Regulation Group, Civil Aviation Authority (UK). CAA Document No. 743, *Civil Air Displays: A Guide for Pilots*, Transport Canada, 2003. *Maintenance and Manufacturing Staff Instructions, MSI 52, Issuance of Special Certificate of Airworthiness - Limited*, 03/31/2006.
- U.S. Department of Defense. Manual 4160.28 (volume 3), *Defense Demilitarization: Procedural Guidance*, June 7, 2011.
- USAF. AFP 127-1 and NAVAIR 00-80T-116-2, *Technical Manual Safety Investigation, Volume II Investigative Techniques*, July 31, 1987.
- USAF TO 1-1-300, *Maintenance Operational Checks and Flight Checks*, June 15, 2012.
- USAF TO 1-1-691, *Corrosion Prevention and Control Manual.*
- USAF TO 1-1A-1, *Engineering Handbook Series for Aircraft Repair, General Manual for Structural Repair*, November 15, 2006.

References and Bibliography

Published Sources

2010 Nall Report, AOPA Air Safety Institute. Frederick, Maryland, 2010.
49 U.S.C.
AC 43.18 Fabrication of Aircraft parts by Maintenance Personnel.
Accident Report. Air Forces Monthly, No. 221 (August 2006).
Accident Report. Air Forces Monthly, No. 294 (September 2012).
ACCIDENTE MAYOR DE AERONAVE CESSNA A-37 DE LA FUERZA AÉREA URUGUAYA, INFORME FINAL DEL ACCIDENTE DEL CESSNA A-37, Uruguay Air Force, March 26, 2004.
Advisory Circular AC 120-17A *Maintenance Control by Reliability Methods*. FAA, March 27, 1978.
Aerodynamics for Naval Aviators. NAVPERS 00-8-T-80, Revised January 1965.
Aeronautical Material Shelf Life Program. *Mech (*Winter 1974).
Air Power Analysis: Continental US Air Force. *World Air Power Journal*, Vol. 4 (Winter 1990/1991).
Allport, Dave. 1991 Write-Offs Review. *Air Forces Monthly*, No. 53 (August 1992).
Andrade, John M. *Latin-American Military Aviation.* Midland Counties Publications, Leicester, England, 1982.
Attrition. *Air Forces Monthly*, No. 284 (November 2011).
Aviação Militar na América Latina. *Flap International*, Vol. 42, No. 394 (Julho 2005).
Aviation Machinist's Mate 1 & Chief (Assignment Booklet). Bureau of Naval Personnel, NAVPERS 91599, 1959.
Bodemer, Alfred. *Les Turbomachines Aeronautiques Mondiales*. Éditions Larivière, Paris, 1989.
CAP 6–2 – Operation of 'Permit-to-Fly' Ex-Military Aircraft on the UK Register. UK CAA, 2009.
CAR/CAM 1.73-1(a), Experimental Airworthiness Certificates: Type of Operations, CAR/CAM 1.74, Experimental Certificates, Requirements for Issuance, and CAR/CAM 1.75-1, Experimental Certificates: Duration.
Casualties. *Aircraft Illustrated*, Vol. 31, No. 7 (July 1998).
Casualties. *Aircraft Illustrated*, Vol. 38, No. 10 (October 2005).

Castro, Raoul. *Corporate Aviation Management.* Southern Illinois University Press, Carbondale, Illinois, 1995.
Cessna T-37/A-37 (Famous Airplanes of the World*). Koku-Fan*, No. 69 (January 1, 1976).
Cicalesi, Juan Carlos. Fuerza Aérea Uruguaya: Passado e Presente. *Segurança & Defesa*, No. 78 (2004).
CJAA Annual Convention 2011 Safety Review. (March 19, 2011).
Cook, Jerry W. (Brig. Gen. USAF, Retired). *Once a Fighter Pilot.* McGraw-Hill, New York, 1996.
Conditional Donation of an F-4D Aircraft. Audit Report, DOD Office of the Inspector General, Report No. 97-222, September 30, 1997.
Corum, James S. The Air War in El Salvador. *Aerospace Power Journal* (Summer 1998).
Cotter, Jarrod. Safety First. *Flypast*, No. 238 (May 2001).
Cotter, Jarrod. Temora's Drangonflies. *Air Enthusiast*, Issue 111 (May/June 2004).
Croft, John. RVSM Non-Compliance Alarming FAA. *Flight International*, Vol. 181, No. 5325 (7-13 February 2012).
Crosby, Chester G. (Dr.) *Readings in Aircraft Maintenance Management, MAS 609-2.* Embry-Riddle Aeronautical University, Daytona Beach, February 1991.
Crosby, Francis. *A Handbook of Fighter Aircraft*. Hermes House, London, 2002.
CRM for the Single Pilot. *Vector* (May/June 2008).
Crusius, Timothy and Channell, Carolyn E. *The Aims of Argument*. McGraw-Hill, New York, 2003.
Darling, Kev. *Tweet and the Dragonfly: The Story of the Cessna A-37 and T-37.* Big Bird Aviation Publication, Lulu.com, 2005.
Department of Defense MANUAL 4160.28, Volume 3, June 7, 2011 *Defense Demilitarization: Procedural Guidance.*
Deteriorated Parts Blamed for Reno Crash. *General Aviation News*, Vol. 64, No. 17 (September 7, 2012).
Donald, David and Lake, Jon. *The Encyclopedia of Word Military Aircraft.* Barnes & Noble Books, New York, 2000.
Donaldson, T. S. and Poggio, E.C. *Depot Inspection and Repair Capability: Unique or Redundant?* USAF, Rand Corporation, November 1974.
Dorr, Robert F. *Air Combat: An Oral History of Fighter Pilots.* Caliber Books, New York, 2006.
Dorr, Robert F. History in Blue: Vietnam Era's Dragonfly a Ground-Support Warrior. *Air Force Times* (January 13, 2003).
Drendel, Lou. TAC: A Pictorial history of the USAF Tactical Air Command 1970-1977. Squadron Signal Publications, Carrolton, Texas, 1978.
Dunnell, Ben. Eagles High. Aircraft Illustrated, Vol. 37, No. 11 (November 2004).
Eden, Paul and Moeng, Soph. *Modern Military Aircraft Anatomy.* Metro Books, Aerospace Publishing Ltd., London, 2002.
Engineering Handbook Series for Aircraft Repair, General Manual for Structural Repair, NAVAIR 01-1A-1.
FAA-H-8083-1 *Aircraft Weight and Balance Handbook.*
Fixed Wing Aircraft Structural Life Limits, NAVAIRINST 13120.1.
Flintham, Victor. *Air Wars and Aircraft: A Detailed Record of Air Combat, 1945 to the Present.* Facts on File, New York, 1990.
Ford, Daniel. From Tweet to Predator: A Pictorial History of Cessna's Amazing T/A-37 Family. *Air Enthusiast*, Issue 111 (May/June 2004).

Fuel Facts: Safe Handling of JP Fuels. Approach (November 1962).
Gander, Terry. *Encyclopedia of the Modern Royal Air Force.* Guild Publishing, London, 1984.
Girao Alatrista, Víctor. *Cae Avíon FAP: La Verdad Del Accidente.* Bufete Girao y Asociados, San Isidro, Lima, Peru, 2007.
Green, William and Swanborough, Gordon. *Flying Colors*. Salamander Books, Ltd., London, 1981.
Grolleau, Henri-Pierre. Ozfest. *Aircraft Illustrated*, Vol. 36, No. 11 (November 2003).
Guevara, Iñigo, Moyano. *Latin American Fighters: A History of Fighter Jets in Service With Latin American Air Arms.* Harpla Publishing, Houston, Texas, 2009.
Hagedorn, Dan. *Latin American Air Wars*, Hikoki Publications Ltd.: 2006.
Happy Four! Flypast, No. 273 (April 2004).
Higdon, David. Aircraft as Antenna Farm. *Avionics*, Vol. 49, No. 9 (September 2012).
Honour, Walt. Lt. Cdr. Spin/Departure Training: A Must! *Approach* (April 1976).
Hünecke, Klaus. *Jet Engines: Fundamentals of Theory, Design and Operation*. Motorbooks International, Osceola, Wisconsin, 2000.
Hwang, Glenn. From Tweety Bird to Dragonfly. *Wings*, Vol. 32, No. 6 (December 2002).
Jackson, Robert and Winchester, Jim. *Military Aircraft: 1914 to the Present Day.* Barnes & Noble, New York, 2007.
Jackson, Robert and Winchester, Jim. *Military Aircraft Compared and Contrasted.* Barnes & Noble, New York, 2006.
Jensen, Terry L. Eject! Eject! *Air Classics Quarterly Review* (Summer 1976).
Joiner, Stephen. *Legends of Vietnam: Super Tweet.* Air & Space Magazine (January 2010).
Kamine, Milton. *Jet Fighter Accident/Attrition Rates in Peacetime: An Application of Reliability Growth Modeling.* RAND Corporation, Memorandum RM-5563-PR, Prepared for the USAF, March 1968.
Kappas, Joanna. *Review of Risk and Reliability Methods for Aircraft Gas Turbine Engines.*
DSTO-TR-1305, DSTO Aeronautical and Maritime research Laboratory, Victoria, Australia,
May 2002.
Knott, Chris. La Force Aérienne Colombienne. *Jets*, No. 12 (Décembre 1996).
Laureau, Patrick. Fuerza Aérea Uruguaya. *Air Action*, No. 17 (Mai 1990).
Laureau, Patrick. Punta Arenas. *Air Fan*, No. 137 (Avril 1990).
Les Avions en Vol et au Combat. Editions Atlas, Paris, France, 1982.
Lightning Crash Report Published. *Classic Aircraft* (October 2012).
Lister, Pete. Maintenance Control: Keystone of Squadron Ops. *Naval Aviation News*, (March/April 1986).
Lednicer, David. *Airfoils.* Analytical Methods, Inc.
Lert, Frédéric. Fuerza Aérea Salvadoreña. *Air Fan*, No. 243 (Février 1999).
Lone Star's Dragonfly. *Warbirds International*, Vol. 14, No. 2 (March 1995).
Love, Terry. *A-37/T37 Dragonfly in Action.* Squadron Signal Publications, Carrollton, Texas, 1990.
Maintenance and the Aircraft Accident Rate. *Approach* (May 1962).
Malloy, Alfred M. Corrosion Control in Naval Aircraft. *Naval Aviation News* (May 1975).
Martin, Patrick. *Tail Code: The Complete History of USAF Tactical Aircraft Tail Code Markings.* Schiffer, Atgen Pennsylvania, 1994.
Matricardi, Paolo. *The Great Book of Combat Aircraft.* Vmb Publishers, Vercelli, Italia, 2006.

Mikesh, Robert C. *Flying Dragons: The South Vietnamese Air Force.* Schiffer Publications, Atgen, Pennsylvania, 2005.
Miyashita, T. Rebuilt Aircraft Tires Are as Good or Better Than New Tires. *Mech* (Winter 1974).
Mueller, Robert. *Air Force Bases Volume I, Active Air Force Bases Within the United States of America on 17 September 1982.* Office of Air Force History, 1989
Nalty, Bernard C. *Air War Over South Vietnam 1968-1975*. Air Force History and Museums Program, USAF, Washington, DC, 2000.
Newdick, Thomas, and Cooper, Tom. *Modern Military Airpower 1990-Present.* Amber Books, London, 2010.
O'Connor, Paul, Buttrey, Samuel E., O'Dea, Angela, and Kennedy, Quinn. *An Assessment of the Relationship Between Safety Climate and Mishap Risk in U.S. Naval Aviation.* Defense OSD Readiness Programming and Assessment, Defense Safety Oversight Council, Washington, D.C., October 2011.
Operation of Warbirds at Bankstown. *Flight Safety Australia* (March-April 2000).
Overall, Mario E. Combat Dragons: Guatemala's Cessna A-37s. *Air Enthusiast,* Issue 111 (May/June 2004).
Parrish, Robert L. Maintenance Records and Compliance. *Business & Commercial Aviation,* March 1989.
Racines, Oscar Forero. *75 Años en Los Cielos Patrios*. Editorial Margabby, Colombia, 1994.
Ravenstein, Charles A. *Air Force Combat Wings Lineage and Honors Histories, 1947–1977*. Maxwell AFB, Alabama: Office of Air Force History, 1984
Richardson, Doug. *The Illustrated Encyclopedia of Modern Warplanes.* Crescent Books, New York, 1982.
Rivas, Santiago, and Tokunaga, Katsuhiko. Chilean Air Power. *Combat Aircraft*, Vol. 9, No. 3 (June-July 2008).
Safety Investigation, Volume 1: Investigative Techniques. AFP 127-1, Department of the Air Force, Washington, DC, May 29, 1987.
Safety Investigation, Volume 2: US Air Force Guide to Mishap Investigation, Volume 1. AFP 127-1, Department of the Air Force, Washington, DC, May 29, 1987.
Sap, Marnix. FAU: Fuerza Aérea Uruguaya. *International Air Power Review*, (Fall 2002).
Schlesinger, Robert J. *Principles of Electronic Warfare.* Peninsula Publishing, Los Altos, California, 1961.
Sgarlato, Nico. *USAF Aircraft of Today*. Squadron Signal Publications, Carrolton, Texas, 1978.
Shiel, Walt. *Cessna Warbirds: A Detailed & Personal History of Cessna's Involvement in the Armed Forces.* Jones Publishing, Iola, Wisconsin, 1995.
Spick, Mike. *The Great Book of Modern Warplanes.* Salamander Books Limited, London, 2000.
Splendid Vision, Unswerving Purpose: Developing Air Power for the United States Air Force During the First Century of Powered Flight. Air Force Materiel Command, Wright-Patterson Air Force Base, 2002.
Steinemann, Peter. Fuerza Aérea de Chile. *World Air Power Journal*, Vol. 1 (Spring 1990).
Stoll, Laurence W. *Analysis of Operations and Support Cost Trends or Why do Aging Aircraft Cost so Much. Briefing for Ageing Aircraft Forum*, October 6-8, 2004 (Power Point Presentation).
Sturgeon, W. R. *Canadian Forces Aircrew Ejection, Descent and Landing Injuries, 1 January 1975- 31 December 1987.* Defense and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada, December 1988.

System Safety Program Requirements – Military Standard – MIL-STD-882B. AMSC No. F3329, DOD, Washington, D.C., June 28, 1977.
Swaine, Liz. *NTSB Reveals Error Chain in Hawker Hunter Fatality.* Avweb, May 9, 2004.
T-37, T-38, F-5 A/B Aircraft Accident Summary (1 January Through 31 December 1966). Summary Number 10-67. Norton AFB, 1967.
Taylor, Bill. *Royal Air Force Germany*. Midland Publishing, Hinckley, England, 2003.
Taylor, Michael J. H. *Jet Warplanes.* Gallery Books, New York, 1984.
The Aircraft Gas Turbine Engine and Its Operation. United technologies, Pratt & Whitney, August 1988.
The Civil Aeronautics Act of 1938, as Amended. Revised September 1, 1948, Washington, DC.
Torrin, Ken. *A Guide to Vietnam Era Warplanes: Cessna A-37 Dragonfly*. Webster's Digital Services, February 2012.
Treister, Suzanne. *NATO: The Military Codification System for the Ordering of Everything in the World.* Black Dog Publishing, London, 2008.
Tuttle, Jim. *Eject! The Complete History of US Aircraft Escape Systems.* MBI Publishing Company, St. Paul, Minnesota, 2002.
Van der Ende, Cees-Jan. Latin Fighters. *Combat Aircraft*, Vol. 10, No. 1 (February-March 2009).
Wetterhahn, Ralph. Escape to U Taphao. *Air & Space Magazine* (January 1997).
Wilkerson, Dave. CRM and ADM. *Flight Training, (*September 2008).
Winchester, Jim (Ed.) *American Military Aircraft*. Barnes & Noble Publishing, 2005.
Write-Offs. *Air Forces Monthly*, No. 115 (October 1997).

Organizations

A-37 Dragonfly Association.
Aircraft Accident Investigation Board (AAIB), UK.
Air Force Association (AFA).
Air Force Safety Center.
Aircraft Owners and Pilots Association.
Australia Civil Aviation Safety Authority.
Australia Warbirds Association, Ltd.
Experimental Aircraft Association (EAA).
Flight Safety Foundation.
International Fire Training Centre.
Latin American Aviation Historical Society (LAAHS).
National Transportation Safety Board (NTSB).
Naval Safety Center.
Smithsonian Air and Space Museum.

Web Sources

http://a-37chile.blogspot.com/
http://archivo.presidencia.gub.uy/noticias/archivo/2004/marzo/2004032605.htm
http://aviation-safety.net/index.php

http://casa-query.funnelback.com/search/search.cgi?collection=casa_aircraft_register&query=A-37&session=445421615
http://classicjets.org
http://www.e-publishing.af.mil
http://encycl.opentopia.com/term/Cessna_T-37
http://forum.keypublishing.com
http://forum.scramble.nl
http://modocharlie.com/2011/02/a-37b-ex-fach-para-colombia/
http://reportperu.wordpress.com/2010/01/09/fap-negocia-compra-de-18-a-37-%E2%80%9Cdragonfly%E2%80%9D-a-corea-del-sur-y-12-%E2%80%9Ctucano%E2%80%9D-a-brasil/
http://safetycenter.navy.mil/
http://www.110aw.ang.af.mil/history/index.asp
http://www.180.com.uy/articulo/Indagan-accidente-aereo-de-2004
http://www2.hurlburt.af.mil/library/factsheets/factsheet.asp?id=3434
http://www.a-37.org/
http://www.acc.af.mil
http://www.aero-news.net
http://www.aeroflight.co.uk/waf/americas/guatemala/Guatemala-af-A37B.htm
http://www.acig.info/CMS/index.php?option=com_content&task=view&id=89&Itemid=47
http://www.afsec.af.mil/shared/media/document/AFD-090922-084.pdf
http://www.airforce-magazine.com/MagazineArchive/Magazine%20Documents/2011/
http://www.airliners.net
http://www.airspacemag.com/military-aviation/escape.html
http://www.airventure.org
http://www.amarcexperience.com
http://www.aviastar.org/comments/comments.php?order=0&aircraft=0631
http://www.aviation-history.com
http://www.aviationmuseum.com.au/aircraft_colection/dragonfly/index.html
http://www.aviamarket.org/reviews/military-aircraft/994-cessna-a-37.html
http://www.avweb.com/avwebflash/briefs/187264-1.html
http://www.australianwarbirds.com.au
http://www.caa.co.za/
http://www.cessnaflyer.org/view-article.php?id=194
http://www.controller.com
http://www.defenseindustrydaily.com/peru-pakistan-asking-about-korean-dragonflys-04510/
http://www.designation-systems.net/usmilav/jetds/an-asq.html
http://www.elheraldo.co/local/un-dragon-nacio-en-la-base-aerea-de-cacom-iii-8431
http://www.enginehistory.org
http://www.ejection-history.org.uk
http://www.ejectionsite.com
http://www.faa.gov/regulations_policies/advisory_circulars
http://www.fach.cl
http://www.fau.mil.uy/aeronaves.html
http://www.gainesvilleregister.com/empty/x345563225/Weber-Aircraft-past-and-present
http://www.joebaugher.com/usaf_serials/1969.html
http://www.laahs.com/forum.php

http://www.piuraweb.com/index.php?option=com_content&task=view&id=931&Itemid=31
http://www.sicuropublishing.com
http://www.skyscrapercity.com/showthread.php ?t=1338956
http://www.taringa.net/posts/apuntes-y-monografias/10137819/Fuerza-Aerea-Uruguaya---Aviacion.html
http://www.thai-aviation.net/files/Air_Accidents.pdf
http://www.uswarplanes.net/t37a37.html
http://www.vermontel.net/~tomh/AIRCRAFT/T37_A37/T37_A37.html
http://www.youtube.com/watch ?v=BVQy7G7Z-SA&feature=related
http://www.warbirdalley.com
http://www.warbirdalley.com/a37.htm

Attachment 5 – Partial Listing of A-37 Accidents and Relevant Incidents

#	Date	Version	Operator	Severity	Probable Cause and Remarks
1.	June 30, 2012	O/A-37B	Colombian AF	Nonfatal	Take-Off Accident – Aborted Take-Off (Fire)
2.	2010	A-37B	El Salvador AF	Fatal	Landing Accident
3.	July 24, 2009	A-37B	VH-XVA	Nonfatal	Hydraulic System Failure (AND)
4.	September 12, 2008	A-37B	Ecuador AF	Nonfatal	Damaged in Accident (Not repaired)
5.	May 24, 2007	A-37B	Ecuador AF	Unknown	Unknown
6.	March 26, 2007	A-37B	Chilean AF	Fatal (2)	Unknown
7.	May 5, 2006	A-37B	ROKAF	Fatal	Acrobatics
8.	2006	A-37B	Guatemala AF	Unknown	Unknown
9.	August 3, 2005	O/A-37B	Colombian AF	Unknown	Landing Accident
10.	February 10, 2004	A-37B	Peruvian AF	Unknown	Unknown
11.	January 31, 2004	O/A-37B	Uruguayan AF	Fatal (2)	LOC in Weather – Possible Electrical Failure
12.	November 18, 2001	A-37B	Chilean AF	Nonfatal	Landing Gear Failure (Failure to Extend) (AND)
13.	August 23, 2001	A-37B	Peruvian AF	Fatal	Possible LOC – Ejection Seat Failure
14.	2004?	A-37B	N91RW	Nonfatal	Landing Accident
15.	August 1, 2000	O/A-37B	Colombian AF	Unknown	Bird Strike - Engine Failure
16.	2000	A-37B	Dominican AF	Unknown	Unknown
17.	May 8, 1998	A-37B	ROKAF	Fatal (1)	Mid-Air
18.	1998	A-37B	Dominican AF	Unknown	Unknown
19.	November 10, 1997	A-37B	Dominican AF	Unknown	Unknown
20.	December 29, 1996	O/A-37B	Colombian AF	Fatal	Mechanical Failure
21.	June 28, 1996	O/A-37B	Colombian AF	Fatal (2)	Unknown
22.	November 10, 1996	A-37B	Dominican AF	Unknown	Unknown
23.	1995	A-37B	Ecuador AF	Unknown	Unknown
24.	October 24, 1994	O/A-37B	Colombian AF	Unknown	Unknown
25.	August 16, 1996	O/A-37B	USAF	Nonfatal	LOC – Fuel Imbalance – Spin
26.	February 11, 1994	A-37B	Ecuador AF	Unknown	Unknown
27.	February 7, 1994	O/A-37B	El Salvador AF	Nonfatal	Landing Accident
28.	1993	O/A-37B	El Salvador	Fatal	Unknown
29.	June 7, 1991	T-37B	N120DB	Fatal	Mid-Air with A-26
30.	February 28, 1991	O/A-37B	Colombian AF	Unknown	Unknown
31.	1991	A-37B	Chilean AF	Unknown	Unknown
32.	April 24, 1990	A-37B	Thai AF	Fatal	Unknown
33.	April 23, 1990	A-37B	Peruvian AF	Fatal (2)	Mid-Air (1st Aircraft)
34.	April 23, 1990	A-37B	Peruvian AF	Fatal (1)	Mid-Air (2nd Aircraft)
35.	April 23, 1990	A-37B	Peruvian AF	Fatal (1)	Mid-Air (3rd Aircraft)
36.	April 10, 1990	O/A-37B	USAF AF	Unknown	Bird Strike
37.	1989	A-37B	Honduras AF	Nonfatal	Unknown
38.	June 16, 1988	A-37B	El Salvador	Unknown	Unknown
39.	March 25, 1988	OA-37B	USAF	Fatal (2)	Night Flight
40.	1988	A-37B	Honduras AF	Unknown	Unknown (1st Aircraft)
41.	November 12, 1987	A-37B	Honduras AF	Unknown	Unknown (1st Aircraft)

42.	November 12, 1987	A-37B	Honduras AF	Unknown	Unknown (2nd Aircraft)
43.	October 7, 1987	A-37B	Uruguayan AF	Unknown	Mid-Air (1st Aircraft)
44.	October 7, 1987	A-37B	Uruguayan AF	Unknown	Mid-Air (2nd Aircraft)
45.	March 15, 1987	O/A-37B	El Salvador AF	Unknown	Unknown
46.	October 2, 1986	O/A-37B	Colombian AF	Unknown	Unknown
47.	September 25, 1986	A-37A	N3757Z	Fatal	Severe Weather (Thunderstorms)
48.	July 10, 1986	A-37B	Chilean AF	Unknown	Unknown (1st Aircraft)
49.	July 10, 1986	A-37B	Chilean AF	Unknown	Unknown (2nd Aircraft)
50.	June 24, 1986	O/A-37B	USAF	Unknown	Ground Accident
51.	August 13, 1985	O/A-37B	Colombian AF	Unknown	Unknown
52.	April 18, 1985	O/A-37B	USAF	Fatal (2)	Possible LOC
53.	January 15, 1985	A-37B	Guatemalan AF	Unknown	Unknown
54.	February 1984	A-37B	Honduras AF	Unknown	Unknown
55.	1984	A-37B	Dominican AF	Unknown	Unknown (1st Aircraft)
56.	1984	A-37B	Dominican AF	Unknown	Unknown (2nd Aircraft)
57.	October 6, 1983	A-37B	Uruguayan AF	Unknown	Mid-Air (1st Aircraft)
58.	October 6, 1983	A-37B	Uruguayan AF	Unknown	Mid-Air (2nd Aircraft)
59.	May 23, 1984	A-37B	Chilean AF	Nonfatal	Mechanical Failure
60.	May 18, 1983	A-37B	El Salvador AF	Nonfatal	Engine Failure (Test Flight)
61.	February 12, 1982	O/A-37B	Honduras AF	Unknown	Unknown
62.	1981	A-37B	Colombian AF	Unknown	Unknown
63.	November 27, 1980	A-37B	Chilean AF	Fatal (2)	Mid-Air (1st Aircraft)
64.	November 27, 1980	A-37B	Chilean AF	Fatal (1)	Mid-Air (2nd Aircraft)
65.	1980	A-37B	Uruguayan AF	Fatal	CFIT (1st Aircraft)
66.	1980	A-37B	Uruguayan AF	Fatal	CFIT (2nd Aircraft)
67.	March 24, 1979	A-38B	USAF	Unknown	Unknown
68.	October 24, 1978	A-37B	Guatemala AF	Fatal	Low Altitude Acrobatics
69.	June 22, 1978	A-37B	Thai AF	Nonfatal	Unknown
70.	May 27, 1978	A-37B	Chilean AF	Unknown	Unknown
71.	January 16, 1976	A-37B	USAF	Unknown	Explosion
72.	December 4, 1974	A-37B	Thai AF	Unknown	Unknown
73.	July 1974	A-37B	Guatemala AF	Fatal	Duel Engine Flame-Out – Spin
74.	July 1974	A-37B	Guatemala AF	Nonfatal	Hard Landing
75.	July 23, 1972				
76.	March 17, 1972	A-37B	USAF	Unknown	Landing Accident
77.	June 26, 1971	A-37B	Guatemala AF	Fatal	Mid-Air Collision


119
118